

## APPENDIX A: Detailed Site Plan, Layout, and Configuration



SCALE: 1"=2000'



(1) AE 1.5MW INVERTER SKID

PROPOSED 4.75MW ARRAY  
(20664) BOSCH 230W MODULES  
20 DEGREE TILT

SYSTEM INFORMATION			
ARRAY	PITCH/TILT	MAGNETIC ORIENTATION	TRUE ORIENTATION
1	20°	169°	180°

PROPERTY LINE

NEW GAS WELLS (TYP)

REMOVED GAS WELLS (TYP)

EXISTING FCSA MONITORING WELL (TYP)

PROPOSED DC CONDUIT RUN

(1) AE 1.5MW INVERTER SKID

(1) AE 1MW INVERTER SKID

PROPOSED AC CONDUIT RUN

EXISTING AIR MONITORING STATION (TYP)

- NOTES:
1. TOTAL PROPOSED DC CONDUIT RUN IS APPROXIMATELY 4550 FT.
  2. TOTAL PROPOSED AC CONDUIT RUN IS APPROXIMATELY 1580 FT.

ENGINEER	DRAFTER	DESCRIPTION
I. TILFORD	I. TILFORD	PHOTOVOLTAIC SYSTEM



**BOSCH**

BOSCH SOLAR ENERGY  
4009 MIRANDA AVE  
PALO ALTO, CA 94304 USA  
Phone (650) 812-8050

# SITE PLAN - 4.75MW DC

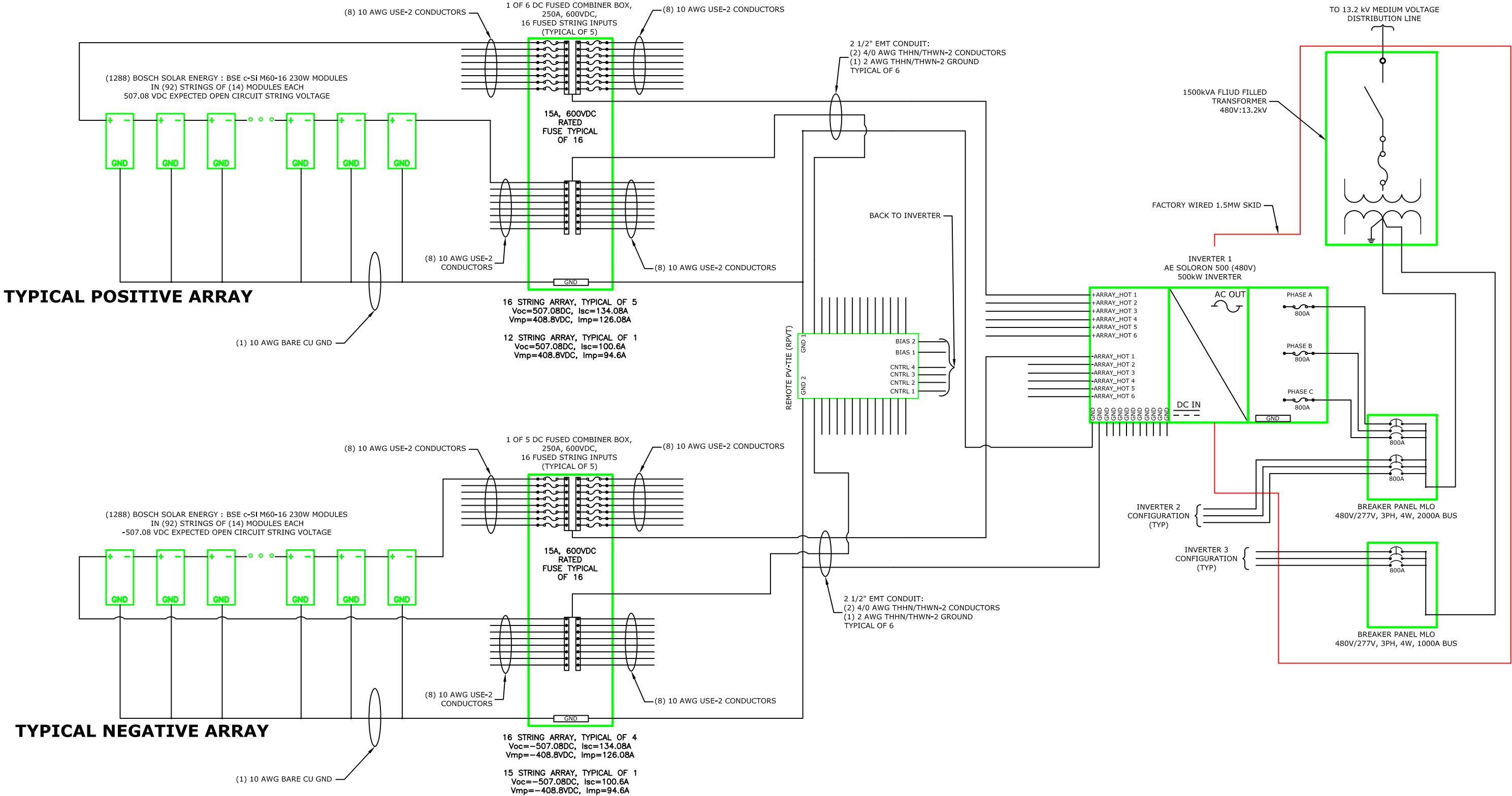
TOWN OF AMHERST LANDFILL  
740 BELCHERTOWN RD.  
AMHERST, MA 01002

L1.1

REV: A  
12/9/2010



1.78MW DC PHOTOVOLTAIC SYSTEM  
CONFIGURATION TYPICAL OF (2)



**BOSCH**

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Phone (650) 812-8050

ELECTRICAL SINGLE LINE

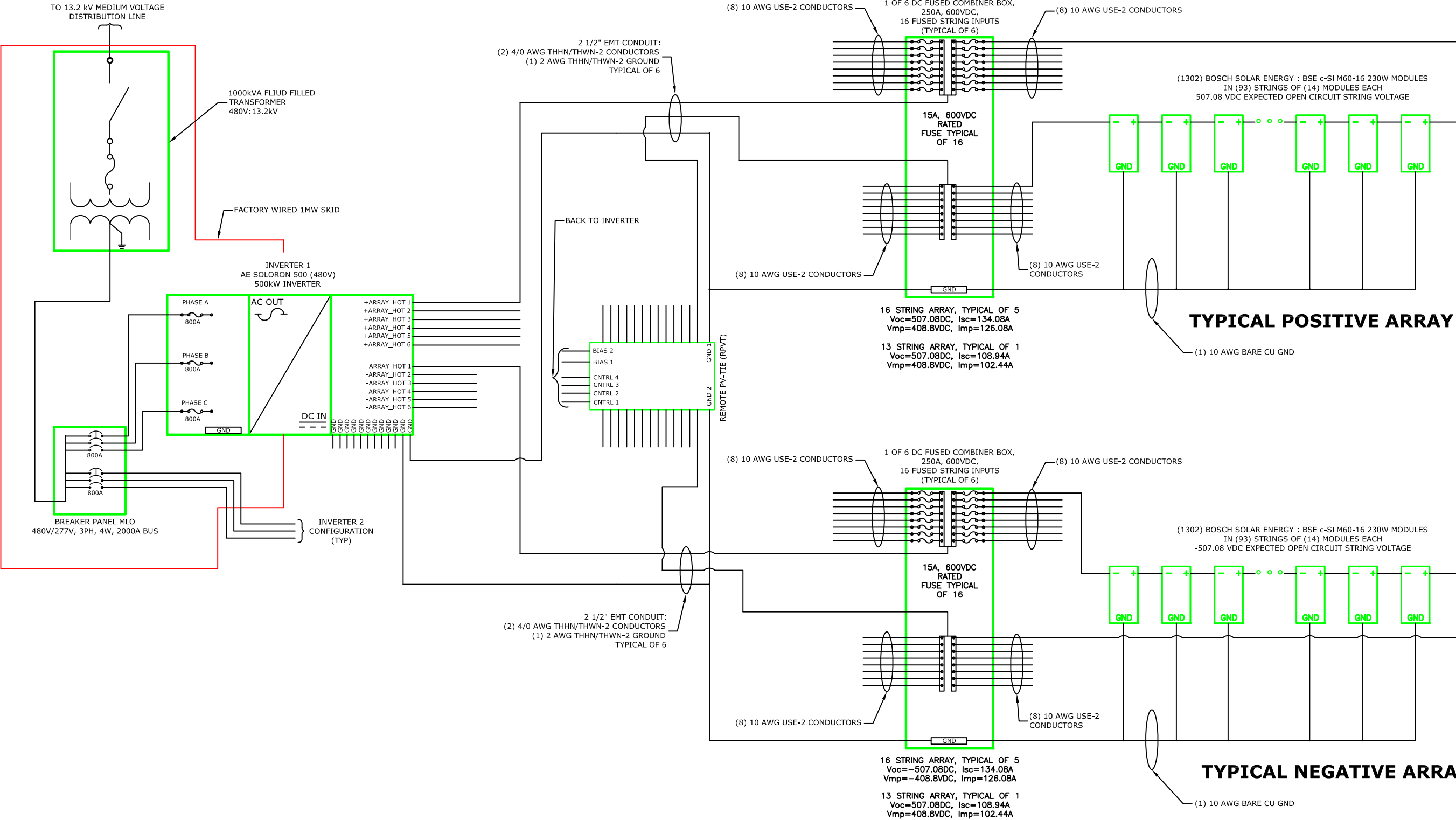
TOWN OF AMHERST LANDFILL  
740 BELCHERTOWN RD.  
AMHERST, MA 01002

ENGINEER	DRAFTER	DESCRIPTION
I. TILFORD	I. TILFORD	PHOTOVOLTAIC SYSTEM

E1.1

REV: A  
12/9/2010

1.198MW DC PHOTOVOLTAIC SYSTEM



ENGINEER	DRAFTER	DESCRIPTION
I. TILFORD	I. TILFORD	PHOTOVOLTAIC SYSTEM



**BOSCH**

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ELECTRICAL SINGLE LINE 2

TOWN OF AMHERST LANDFILL  
740 BELCHERTOWN RD.  
AMHERST, MA 01002

E1.1B

REV: A  
12/9/2010



## APPENDIX B: Equipment Specifications

# **Crystalline solar modules**

Bosch Solar Energy AG





# Crystalline solar modules

## High-yield – easy installation – reliable.

Bosch Solar Energy offers photovoltaic modules based on our highefficiency mono and multi-crystalline 156x156 mm silicon solar cells. These solar modules are characterized by high efficiency and a good price-performance ratio.

### Exceptionally high product quality!

Bosch crystalline solar modules are monitored throughout their entire processing chain, from silicon ingot casting to module production. Measuring devices calibrated on a regular basis enable the performance of solar modules to be gauged under standard test conditions. Easy and safe installation is guaranteed for our crystalline modules as a result of good mechanical stability and the ready-made holes for installing different grounding systems.

### Good annual yields on a long-term basis!

The first-rate product quality in Bosch solar cells ensures excellent performance and a very high efficiency ratio – up to 240Wp/17% in cells and 14.6% in modules – even at sub-optimal levels of sunlight.

### Global awareness of the Bosch brand!

The Bosch brand can be sold on more easily as it maintains its value for end customers over the long term. Bosch unites long-term strategic vision, innovative spirit and efficient processes with its core competences to provide a basis for consistent, continuous development throughout the company.



# Crystalline solar modules

## You benefit from our crystalline solar modules

### Exceptionally high product quality!

- ▶ We monitor our whole process chain from silicon ingot casting to module production
- ▶ 10 year product warranty and 25 year performance warranty

### Using the established Bosch brand!

- ▶ The Bosch brand can be sold on more easily as it maintains its value for end customers over the long term.
- ▶ Bosch is a global brand.
- ▶ Bosch unites strategic vision, innovative spirit and efficient processes with its core competences to provide a basis for consistent, continuous development of the Bosch Group.





# Powerful performance – high stability.

## Bosch Solar Module c-Si M 60

**High-quality – high-performance – reliable.**  
Solar modules from Bosch Solar Energy.



**BOSCH**

**NEW: positive power sorting starting July 1<sup>st</sup> 2010**

**Our crystalline solar modules offer impressive features including:**

- ▶ Excellent quality assured through use of the best European-standard components
- ▶ Excellent processing and long-term stability right along the value-added chain
- ▶ Higher specific yields due to positive power sorting
- ▶ Professional customer service with unbureaucratic order and complaint processing carried out by designated contact persons
- ▶ Simple, safe installation thanks to standardized clamp mechanisms

**Warranty conditions:**

- ▶ 10 years product warranty
- ▶ 25-year performance guarantee (90% up to 10 years, 80% up to 25 years)
- ▶ Product certification to IEC 61215 (ed. 2)
- ▶ Protection class II / IEC 61730
- ▶ CE conformity

Manu- facturer	Length [x]	Width [y]	Height [z]	Weight	Junction box	Plug connector type	Cable [l]	Front glass surface
01	1662.0	992.0	42.0	22	Spelsberg	MC4	2 x 1000	Struc- tured
11	1659.5	988.0	40.0	22	Tyco	Tyco Solarlok	2 x 1000	Struc- tured
14	1660.0	990.0	50.0	21	Spelsberg	MC3	Minus 800 Plus 1200	Struc- tured
x, y, z, l in mm, ±2 mm; weight in kg ±0.5								

Crystalline solar module	
Performance classes	220 Wp, 225 Wp, 230 Wp, 235 Wp, 240 Wp
Performance sorting	±2.5 Wp (-0/+4.99 Wp NEW starting July 1 <sup>st</sup> 2010)
Structure	Glass-foil laminate ► Anodized aluminum frame ► Junction box (IP 65) with 3 bypass diodes ► Weather-resistant back sheet (white)
Cells	60x monocrystalline solar cells in 156 mm x 156 mm format

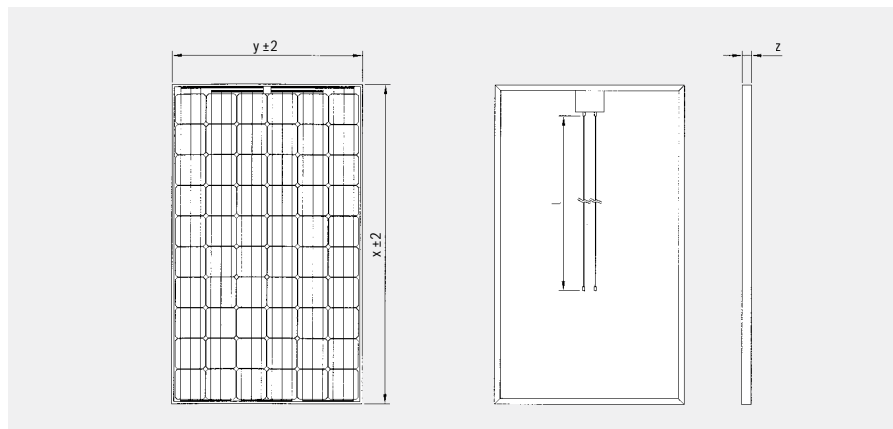
#### Electrical characteristics for STC\*:

Designation	P <sub>mpp</sub> [Wp]	V <sub>mpp</sub> [V]	I <sub>mpp</sub> [A]	V <sub>oc</sub> [V]	I <sub>sc</sub> [A]	Reverse-current load capacity [A]
M240 3BB	240	30.20	7.95	36.80	8.50	17
M235 3BB	235	30.00	7.85	36.60	8.40	17
M230 3BB	230	29.80	7.75	36.40	8.30	17
M225 3BB	225	29.60	7.65	36.20	8.20	17
M220 3BB	220	29.40	7.55	36.00	8.10	17
Reduction in module efficiency with decrease in irradiation level from 1000 W/m <sup>2</sup> to 200 W/m <sup>2</sup> (at 25 °C): -0.65 % (absolute); measuring tolerance P ±3 %						

#### Electrical characteristics for NOCT\*:

Designation	P <sub>mpp</sub> [W]	V <sub>mpp</sub> [V]	V <sub>oc</sub> [V]	I <sub>sc</sub> [A]
M240 3BB	173	27.44	34.09	6.84
M235 3BB	169	27.24	33.89	6.76
M230 3BB	166	27.04	33.69	6.68
M225 3BB	162	26.83	33.49	6.60
M220 3BB	158	26.62	33.30	6.52
NOCT: Normal Operation Cell Temperature 48.4 °C; Irradiation level 800 W/m <sup>2</sup> , AM 1.5, temperature 20 °C, wind speed 1 m/s, electrical open circuit operation				

#### Dimensions\*\*:



#### Notes on assembly:

- See installation and operating manual at [www.bosch-solarenergy.de/en/products/crystallinepvmmodules](http://www.bosch-solarenergy.de/en/products/crystallinepvmmodules)
- Horizontal and vertical assembly possible
- System voltage max. 1000 V

#### Weak light performance:

Intensity [W/m <sup>2</sup> ]	V <sub>mpp</sub> [%]	I <sub>mpp</sub> [%]
800	0.0	-20
600	-0.9	-40
400	-2.1	-60
200	-5.1	-80
100	-8.7	-90
The electrical data applies for 25 °C and AM 1.5.		

#### Thermal characteristics:

Operating temperature range	-40 to 85 °C
Temperature coefficient P <sub>mpp</sub>	-0.50%/K
Temperature coefficient V <sub>oc</sub>	-0.36%/K
Temperature coefficient I <sub>sc</sub>	0.039%/K

\* Electrical parameters are typical mean values from historical production data. Bosch Solar Energy AG assumes no liability for the accuracy of this data for future production batches.

\*\* Drawings are not to scale. For detailed dimensions and tolerances, see above.

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# **Declaration of Conformity**

Bosch Solar Energy AG

## Declaration of Conformity

We,

Bosch Solar Energy AG  
Wilhelm-Wolff-Straße 23  
99099 Erfurt  
Germany

declare under our sole responsibility that the products to which this declaration refers comply with the standards or normative documents listed below.

Description: Crystalline photovoltaic module  
Module type: Bosch Solar Module c-Si P 48  
Bosch Solar Module c-Si M 48  
Bosch Solar Module c-Si M 60  
Bosch Solar Module c-Si P 60

Device safety

EN 61215: 2005 Crystalline silicon terrestrial photovoltaic (PV) modules,  
design qualification and type approval (IEC 61215 Ed. 2)

EN 61730-1,-2:2007 Photovoltaic (PV) module safety qualification – Part 1:  
Requirements for construction; Part 2: Requirements for  
testing (IEC 61730-1,-2:2004, modified)

Conformity is thus guaranteed in accordance with Directive 2006/95/EC relating to Low Voltage.

Erfurt, 1.01.2010



Holger von Hebel (CEO)  
Bosch Solar Energy AG



Peter Schneidewind (CSO)  
Bosch Solar Energy AG



# **Warranties**

Bosch Solar Energy AG

## **Warranty conditions for photovoltaic modules of Bosch Solar Energy AG**

Bosch Solar Energy AG provides a product warranty (A) and a performance warranty (B). The product warranty covers the material and workmanship of the modules, whereas loss of performance (degradation) and minimum output of the modules are exclusively the object of the performance warranty. In Section C: Warranty Conditions the conditions are laid down for both warranties.

### **A: Product warranty**

Bosch Solar Energy AG (in the following “warranty provider”) provides a warranty to the final customer (consumer) under the conditions stated herein for a period of ten years from the delivery date (ex works or warehouse) that the modules are free of defects in material and workmanship.

The product warranty applies exclusively to Ganymed modules and series c-Si solar modules with manufacturer's codes 01 and 11–14,

### **B: Performance warranty**

Bosch Solar Energy AG, Erfurt, provides an independent, voluntary warranty to the final customer for the solar modules distributed by it under the following conditions:

Bosch Solar Energy AG guarantees that the modules will

- a) within a period of ten years from the date of delivery (ex works or warehouse) deliver at least 90% and
- b) within a period of 25 years from the date of delivery (ex works or warehouse) deliver at least 80%

of the minimum performance declared in the data sheet (lower sorting limit of the respective power class less power measurement tolerance).

### **C: Warranty conditions**

#### **1. General**

- 1.1 Warranties are granted only to the final customer. Warranties do not apply to distributors, and installation companies or second-hand purchasers of the modules. Final customers are all parties who have purchased modules for their own needs (not for the purpose of resale) or who have purchased a building on which the modules were first installed. The module must be a part of a solar system in which it was first operated. Warranties of Bosch Solar Energy AG shall not apply to modules which have been dismantled and re-installed, except for the purposes of repair, or have been used for another purpose.
- 1.2 This warranty shall exist independently of legal warranty claims against the vendor of the modules and irrespective of non-contractual claims. Such claims shall be neither limited nor established by this warranty as far as there is no direct purchase contract with Bosch Solar Energy AG. This warranty is an independent, voluntary and complementary service provided by Bosch Solar Energy AG to the final customer. It does not affect the quality agreements between vendor and purchaser.
- 1.3 Expenses for dismantling, testing, disposal, transportation, installation and re-installation of the modules or individual components of these modules within the scope of this voluntary warranty are to be borne by the final customer.
- 1.4 In the event that these warranty conditions deviate from the specifications set forth in the data sheet, these warranty conditions shall prevail.
- 1.5 This product warranty shall apply within the European Union or within a third country in which the module was first placed on the market by Bosch Solar Energy AG. Claims arising from or in connection with this warranty must be filed in writing within the applicable warranty period. No extension of

the warranty period, regardless of legal basis, will be permitted.

### 2. Disclaimers / Liability limitations

2.1 This warranty is valid for normal and correct use and installation, and only under normal operating conditions. The warranty assumes that the performance of the modules has not been reduced (in the assessment of Bosch Solar Energy AG) by actions or events outside the sphere of influence of Bosch Solar Energy AG, in particular:

- Modifications/damage as a consequence of force majeure (storms, hail, fire, power outage, lightning, flooding, snow damage, avalanches, frost, earthquakes, tornadoes, volcanic eruptions, landslides, plagues of insects and other detrimental effects by animals, acts of war, etc.) or damage caused by third parties due to vandalism and theft,
- unprofessional installation, commissioning and operation not in conformance with current installation manual <sup>1</sup>,
- use on mobile units such as vehicles and ships,
- impairment through external influences (dirt, smoke, salt, chemicals and other impurities),
- interconnection with modules made by other manufacturers,
- defects of the system into which the module is integrated,
- insufficient ventilation. In particular the maximum temperatures according to the operating manual may under no circumstances be exceeded.

2.2 Furthermore, warranty claims will only be accepted if the modules have been used according to their intended purpose and do not exhibit any signs of excessive wear and tear or external damage not reconcilable with normal use. The serial number and/or type label must not be damaged. All installation and operating instructions must have been closely followed. Adherence to the safety and warning notes contained therein and the permissible installation and operating conditions specified on the data sheet is a prerequisite for the acceptance of warranty claims.

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<sup>1</sup> Current installation manual available at [www.bosch-solarenergy.de](http://www.bosch-solarenergy.de)

2.3 The total scope of liability of Bosch Solar Energy AG shall be limited to the purchase price of the defective product. The liability of Bosch Solar Energy AG does not cover indirect damage, loss of profits, consequential or indirect damage, any loss of electrical capacity and/or remuneration by an energy supply company.

2.4 Claims under this warranty may not be transferred to a third party.

### 3. Specific performance

3.1 In case of a warranty claim, Bosch Solar Energy AG shall, at its own discretion, replace the module with a new module of the same type, remedy the defects or refund the current market value of the module. The current market value shall be derived from the purchase price less an annual linear depreciation based on an anticipated useful life of 25 years. Should the type of module no longer be produced at the time of the warranty claim, Bosch Solar Energy AG shall be permitted to supply another type of solar module (different size, shape, colour and/or capacity). In this case, Bosch Solar Energy AG shall be entitled to demand the difference between the gross value of the replacement module and the current market value of the module to be replaced. Modules thus replaced shall become the property of Bosch Solar Energy AG.

3.2 No other claims shall be derived from this warranty

3.3 For modules newly supplied or repaired, only the remaining time of the original warranty period shall apply.

### 4. Implementation/Enforcement of the performance warranty

4.1 All warranty claims must be submitted without delay in writing to

Bosch Solar Energy AG  
Wilhelm-Wolff-Straße 23  
99099 Erfurt

4.2 The prerequisite for the acceptance of warranty claims is submission of the warranty certificate along with the original bill of sale to Bosch Solar Energy AG.

- 4.3 The final customer must also submit written proof that the module performance has fallen below the minimum guaranteed by Bosch Solar Energy AG. This evidence must be provided in the form of the certified test results of an accredited expert or institution (e.g. Fraunhofer Institute). Module performance shall be measured by Bosch Solar Energy AG under standard test conditions (25°C cell temperature, irradiation 1,000 W/m<sup>2</sup> and spectrum AM 1.5).

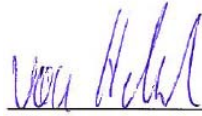
Output will be measured in each case at the ends of the pre-assembled connector on the rear of the module. The final customer must maintain the standard test conditions while producing evidence that the performance has fallen below the guaranteed minimum performance.

Bosch Solar Energy AG reserves the right to verify the shortfall in performance. If the test body commissioned by Bosch Solar Energy AG comes to the conclusion that the divergence is permissible or that no divergence exists, Bosch Solar Energy AG shall be entitled to claim a refund of the performance test costs.

- 4.4 Claims arising from or in connection with this warranty must be filed in writing within the applicable warranty period as well as within three months of the occurrence of the event giving rise to the claim. No consideration will be given to late complaints. The determining factor for adherence to the deadline shall be timely receipt.
- 4.5 All legal disputes arising from this warranty shall be governed by the law of the Federal Republic of Germany. The UN Sales Convention (CISG) and conflict of law rules do not apply.
- 4.6 The customer shall only be entitled to return modules with the prior written consent of Bosch Solar Energy AG.

These warranties shall be applicable to modules delivered between January 1, 2010 and the day new warranties become effective. The previous provisions shall be applicable to modules delivered prior to January 1, 2010.

Erfurt, January 1, 2010



**Holger von Hebel**  
Chief Executive Officer



**Peter Schneidewind**  
Chief Sales Officer





## Solaron® 500 kW PV Inverter

*Next-generation 500 kW PV inverter with breakthrough efficiency and better BoS for utility-scale, grid-tie photovoltaic installations*

### Benefits

- Increase system ROI
- Reduce balance-of-system (BoS) costs
- Achieve higher energy harvests
- Monitor and control with flexible, integrated communications
- Rely on worldwide service and support

### Features

- 500 kW, high-power, transformerless, bipolar design
- Largest core engine in North America—with the industry's smallest footprint and lightest weight in its class.
- 97.5% CEC efficiency
- IDS™ communications
- Remote PV Tie (RPT™) accessory
- Nearly three decades of experience in solar PV industry
- 24 x 7 x 365 global service and support



2008 recipient of Frost & Sullivan Product Innovation Award



2009 recipient of EE Times ACE Award in Most Innovative Renewable Energy category

<http://www.eetimes-ace.com/winners.php>

Achieve higher, faster PV system ROI and better BoS optimization with Advanced Energy's latest Solaron® inverter model. The durable, robust, 500 kW PV inverter is ideally suited for utility-scale or large commercial PV installations. In addition to innovative, high-power, high-efficiency technology, you receive advanced monitoring and control capabilities to provide greater performance insight. An optional Remote PV Tie (RPT™) accessory can cut your BoS costs even further, and our SafeGuard® program offers proactive service that goes far beyond the standard warranty.

### Increase ROI with High Efficiency and Better BoS Optimization

AE extends the Solaron product portfolio with the 500 kW PV inverter for utility-scale or large commercial PV installations. Higher power and breakthrough 97.5% CEC efficiency translate to immediate out-of-pocket savings and greater returns on your investment—faster and at higher levels than previously possible.

Our field-proven, bipolar, transformerless PV architecture efficiently and reliably converts raw, solar DC power to high-quality AC grid electricity. The Solaron inverter has the largest core engine in North America—yet the industry's smallest footprint and lightest weight in its class. This innovative technology provides better balance-of-system (BoS) optimization, which means you can install fewer panels in your PV system for the same energy harvest. Or, alternatively, higher total system efficiency can contribute to years of higher kWh returns.

### Monitor and Control Your System

A secure, integrated LCD and keypad provide fundamental unit data on the exterior inverter cabinet. In addition, the on-board Integrated Data System (IDS™) communications system (included at no additional charge)

collects a wide range of data for remote monitoring and greater performance insight. Features include:

- Detailed unit configuration monitoring and control
- Access to comprehensive performance data
- Valuable product and maintenance documentation

Connect to any web browser for a number of built-in graphical representations of real-time temperature, current, and voltage data—or download a CSV file and configure your own custom data and analysis reports.

### Cut PV System Wiring Costs with Remote PV Tie (RPT™) Accessory

With the addition of an AE Solaron Remote PV Tie (RPT™) accessory, you can further reduce BoS installation costs and achieve even higher system efficiency. The RPT accessory reduces large-diameter copper cables as well as (F)R losses for up to 4% more power output during operation. The RPT also offers flexibility in system design and inverter installation for large, utility-scale solar farms.

### Rely on Our Worldwide Service and Support

The Solaron inverter is durable, robust, and reliable for ongoing, low-maintenance operation. However, if needed, AE's worldwide service organization is available 24 x 7 x 365

for support. We also offer proactive services, including extended warranties (up to 20 years) and SafeGuard® service programs to help you maximize uptime and power generation. Our highly trained specialists can perform routine system queries, remote testing and diagnostics, and annual on-site inspections, all at a nominal cost.

## Solaron® 500 kW Dimensional Drawing



## Solaron® 500 kW Summary Specifications

Physical	
Enclosure	Single cabinet design on sturdy steel frame for transportability and strength
Environmental Rating	NEMA3R NEMA 4 (electronics)
Weight	4100 lb (1859.7 kg)
Connector and Cable Specifications	
Output Power Connectors	4 x 500 MCM wires (Cu or Al) and M10 lug
Input Power Connectors	4 x 500 MCM wires (Cu or Al) and M10 lug
User Interface	Front panel LCD, keypad including security lock-outs, and emergency shutdown button
Electrical	
Output Power	
Max Power	500 kW at 480 VAC
Voltage Range	432 to 528 VAC, 3 Φ, 60 Hz, grounded Wye connection
Frequency	60 Hz
Line Power Factor	> 0.97 typical
AC Current Distortion/TDD	< 5%
AC Line Current	600 A typical 667 A max at 86°F (30°C) and low-line voltage; can be limited with field-adjustable settings 630 A max at 122°F (50°C)
Peak Efficiency & CEC Efficiency	98.5% & 97.5%
Input Power	
Array Configuration	Bipolar using standard PV modules
Voltage	± 330 to ± 600 VDC
MPP DC Current	750 ADC max
Open-Circuit Wake-Up Voltage	± 425 VDC default (configurable)
Standby Tare Losses	100 W
MPPT Window	± 330 to ± 550 VDC
Factory-Installed Communication Interfaces	
	RS-232, RS-422, and RS-485 Ethernet PCMCIA
Data Storage	
	10 years / 1 GB SD card (upgradeable)
Environmental	
Ambient Operating Temperature	-4°F to 122°F (-20°C to 50°C) Cold weather option to -35°C
Storage Temperature	-40°F to 122°F (-40°C to 50°C)
Relative Operating Humidity	0% to 95% non-condensing
Atmospheric Pressure	800 to 1060 mbar (80 to 106 kPa)
Elevation	6000' (1828.8 m) max
Cooling Requirements	
Cooling Medium	Combination air and liquid cooling (self-contained system)
Regulatory	
Directives and Standards	NRTL certified to UL 1741-2005 by CSA International IEEE 519, 929, 1547/1547.1 NEC Article 690 (compatible) CEC Eligible – 97.5%

For more information on the Solaron PV Inverter, visit: [www.aesolaron.com](http://www.aesolaron.com)  
Specifications are subject to change without notice.



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Please see [www.advanced-energy.com](http://www.advanced-energy.com) for worldwide contact information.

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## Solaron® Remote PV Tie (RPT™) Accessory

*Reduce solar PV system installation costs and increase system efficiency even further*

### Benefits

- Increase PV system design and installation flexibility
- Cut PV BoS wiring costs
- Reduce installation labor
- Achieve higher system efficiency

### Features

- Enables PV inverter placement further from the arrays
- Eliminates neutral DC home runs
- Reduces resistive wiring losses
- Reduces wire size

*Advanced Energy® introduced breakthrough efficiency and reliability with the Solaron® line of commercial, grid-tie PV inverters—field-proven, bipolar, and transformerless. Now, with another truly innovative approach, we offer the Remote PV Tie (RPT™) accessory that eliminates common inverter installation obstacles to dramatically reduce BoS installation costs and help you achieve even higher system efficiency.*

Challenging issues for solar PV system designers include inverter placement and ever-increasing BoS installation costs. The Solaron® Remote PV Tie (RPT™) accessory expands conventional installation boundaries. Now you can install your Solaron inverter up to 2000' (609.6 m) from the PV arrays while minimizing cost and optimizing system efficiency.

#### Reduce Solar PV System Installation Costs

Inverters that stand directly adjacent to solar PV arrays are ideal but in many cases not possible or optimal. The greater the distance between arrays and inverters, the more staggering the cost and the greater the DC cable losses. However, when you install the new RPT accessory near your arrays, inverter placement possibilities become virtually unlimited.

The RPT accessory connects the neutrals of the arrays together without returning to the Solaron inverter. Two conduits containing the hot wires

(positive and negative) connect the arrays to the inverter. Inexpensive 16 AWG wire connects the RPT accessory to the inverter. This eliminates the expensive, long-length and large-diameter wires of the neutral DC home-run legs, not to mention conduit and installation labor, which can amount to tens of thousands of dollars. When installed with Solaron inverters, the RPT accessory reduces the distance of DC transmission current twofold over conventional 600 VDC distribution.

#### Achieve Higher Efficiency

During operation, conventional PV installations expend approximately 4% of energy production in resistive wiring losses alone. When you install one or more RPT accessories in the center of the arrays, you cut DC wiring losses in half. You can then position the inverter near the building entrance to reduce AC losses. The result is either higher total system efficiency or the opportunity to use fewer panels in your system installation for the same AC energy harvest.

With the Solaron® RPT™ accessory, you reduce BoS material costs plus gain efficiency.

Example PV System Installation with 500' (152 m) Between the PV Arrays and Solaron® Inverter		
	Conventional Inverter Installation	Installation with Solaron® RPT™ Accessory
Wiring Costs	2 x 500' of large diameter neutral wire = \$12,000	6 x 500' of 16 AWG wire = \$250
Efficiency Gain (Due to Reduction in Resistive Wiring Losses, (I <sup>2</sup> )R Loss)	0% efficiency gain	+2% additional efficiency or fewer panels required

## Specifications

Description	Specifications
Dimensions	24" (H) x 24" (W) x 12" (D) 61.0 cm (H) x 61.0 cm (W) x 30.5 cm (D)
Weight	90 lb (41.8 kg)
Enclosure	NEMA 3R stainless steel
Max MPP Current	500 A @ 333 kW 750 A @ 500 kW
Max Distance Between RPT™ and Solaron® Inverter	2000' (609.6 m)
Input Connector	4 x 500 MCM wire max for each array
Insulation	600 V insulation on control wiring
Operating Temperature	-40 to 122°F (-40 to 50°C)
Directives and Standards	NRTL certification to UL 1741-2005 by CSA International as an accessory to the Solaron inverter

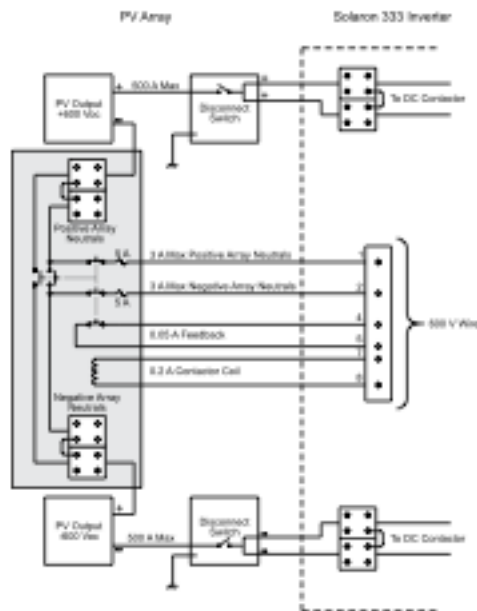


Figure 1. Solaron® RPT™ accessory wiring diagram

Specifications are subject to change without notice.



Advanced Energy Industries, Inc. • 1625 Sharp Point Drive • Fort Collins, Colorado 80525 U.S.A.  
T: 800-446-9167 or +1-970-221-4670 • [support@aei.com](mailto:support@aei.com) • [www.advanced-energy.com](http://www.advanced-energy.com)  
Please see [www.advanced-energy.com](http://www.advanced-energy.com) for worldwide contact information.

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ENI-Indus-PVT-010410-08 10/08

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# Free-Field (FF)-systems Schletter Solar mounting systems ©

## Different terrains - several solutions

- Fast, easy and cost effective installation
- All components made of high-grade steel or aluminium
- 10 year guarantee as on all Schletter systems
- Adaptable to every module type!
- Experience of over 400 Megawatts of ground mounted systems

## FS - System: FS - 3H 3 modules horizontal



The Schletter Free-Field-System is developed to guarantee easy and cost-effective installations of large scale ground mounted systems. The system is adaptable to almost any terrain. The dimensioning of the system is based on exact and detailed analysis of each site including soil analysis, consideration of wind and snow loads in the specific region, as well as pull-out and compression tests of the rack fundamentals. Continual improvement of the system, also regarding the suggestions of our customers, secures our claim to hold the easiest and fastest to mount system on the market. Our goal is to provide solutions that enable the realisation of large scale economic PV-plants, as we see it a necessity to secure the future of our all business.



## *Free-Field (FF)-systems* *Schletter Solar mounting systems ©*



FS 4H / 4modules horizontal



FS 5H / 5 modules horizontal



FS-2V modules vertical



FS-1V / 1 modules vertical



## *Free-Field (FF)-systems*

### *Schletter Solar mounting systems ©*



FS-Vario / manuel track system



FS-Vario / manuel track system



PV-Max



FS-Vario / manuel track system



## Free-Field (FF)-systems Schletter Solar mounting systems ©



### Support and service:

We will be happy to assist you with the planning of your PV-system. To be able to give you professional advice right from the start, we kindly ask you to fill out our Checklist for Free-Filed Systems and contact us.

### Contact us!



#### Director:

**Mr. Martin Hausner**  
2520 N. Jackrabbit Ave.  
Tucson, AZ 85745  
Cell: +1 (520) 820 - 7458  
Email: [martin.hausner@schletter-inc.us](mailto:martin.hausner@schletter-inc.us)



#### Senior sales manager:

**Mr. Sven Kuenzel**  
2520 N. Jackrabbit Ave.  
Tucson, AZ 85745  
Cell: +1 (520) 820 - 8487  
Email: [sven.kuenzel@schletter-inc.us](mailto:sven.kuenzel@schletter-inc.us)

## PvMax3

Filed for patent at the German patent office, No. 20 2009 003 633

### The inexpensive unit assembly system for open areas

- Stability and high duration
- Perfectly harmonized components
- High level of corrosion resistance (100% aluminium)
- Quick and cost-effective project planning, also for special plannings
- Complete structural analysis incl. foundation calculation with dowel recommendation
- Swift mounting (partly pre-assembled support kits)



**The PvMax3 system** is a consequent new and further development on the basis of the PvMax2 and the system components from the IsoTop and FS product range that have been proven in installations with hundreds of megawatts.

The main target in the development was the optimization for high wind and snow loads and cost reduction at the same time. Due to the efficient material utilization, the reduction of the screwed connections to the required minimum, the maximization of the spans and last not least the construction related to real application, these guidelines could be met in an optimum manner. All in all, a considerable cost reduction regarding material and mounting can be obtained.



### Areas of application

The grounding of open area plants on concrete foundations is mainly used in the following conditions:

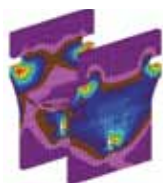
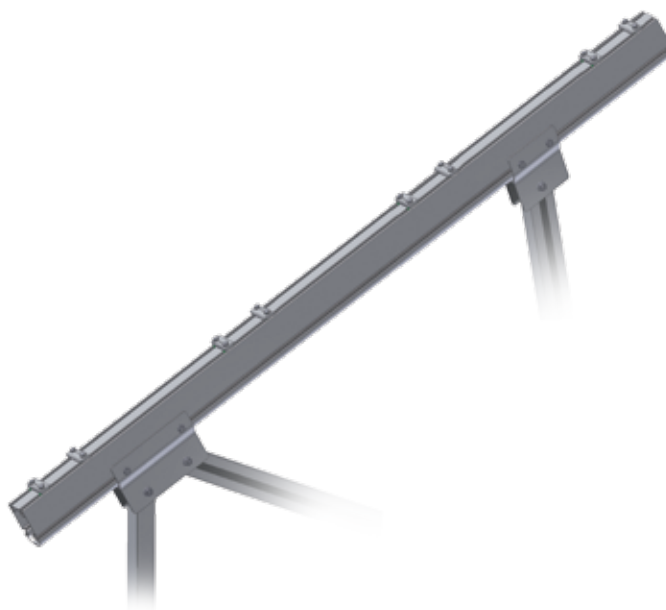
- Small and medium-sized PV-plants (profitability limit regarding costs for soil expertise and trial pile drivings)
- Pile driving is not possible (soil is too soft or too rocky, landfill site or the terrain is not accessible for pile-driving machinery), or inexpensive cast-in-place concrete is available
- Narrow time limit





## Optimization of the connections

- Optimized profile geometries, rationalized production
- Wider spans, thereby, the number of supports and foundations can possibly be reduced
- Partially pre-assembled support kits
- Considerable minimization of the mounting effort
- Optimum price-performance-ratio
- Shapely design

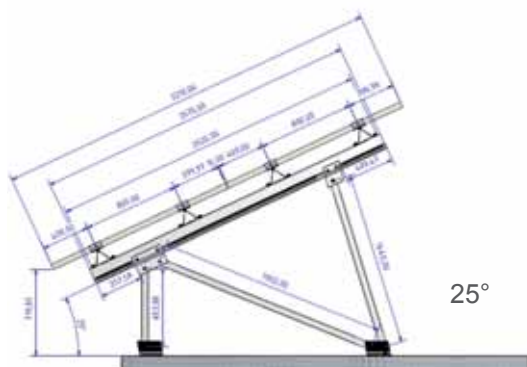
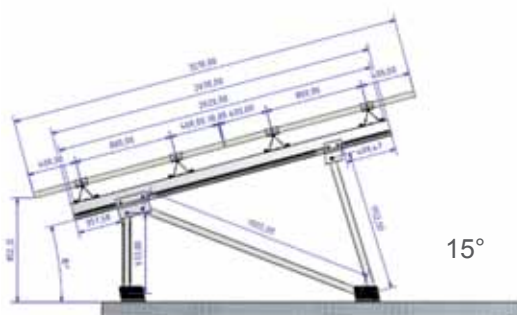


Front: 1 Concrete dowel



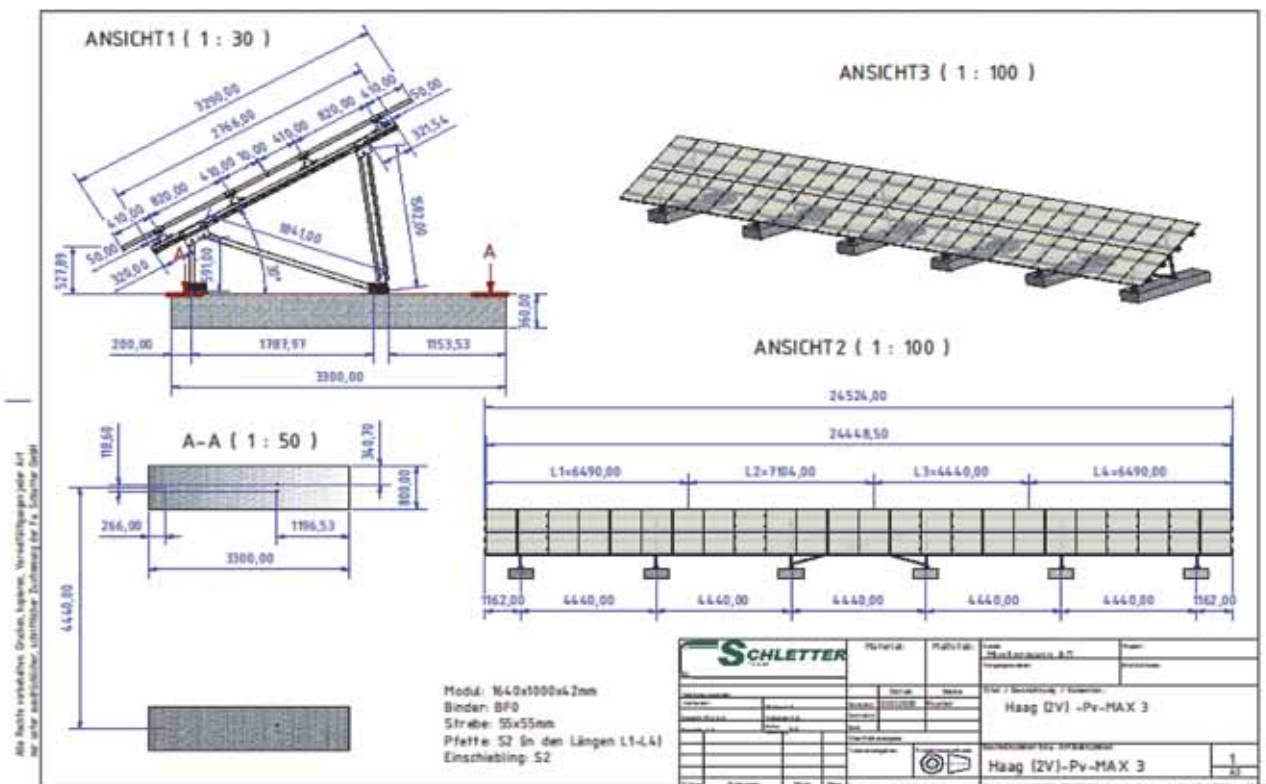
Rear: 2 Concrete dowels

## Project planning of standardized racks

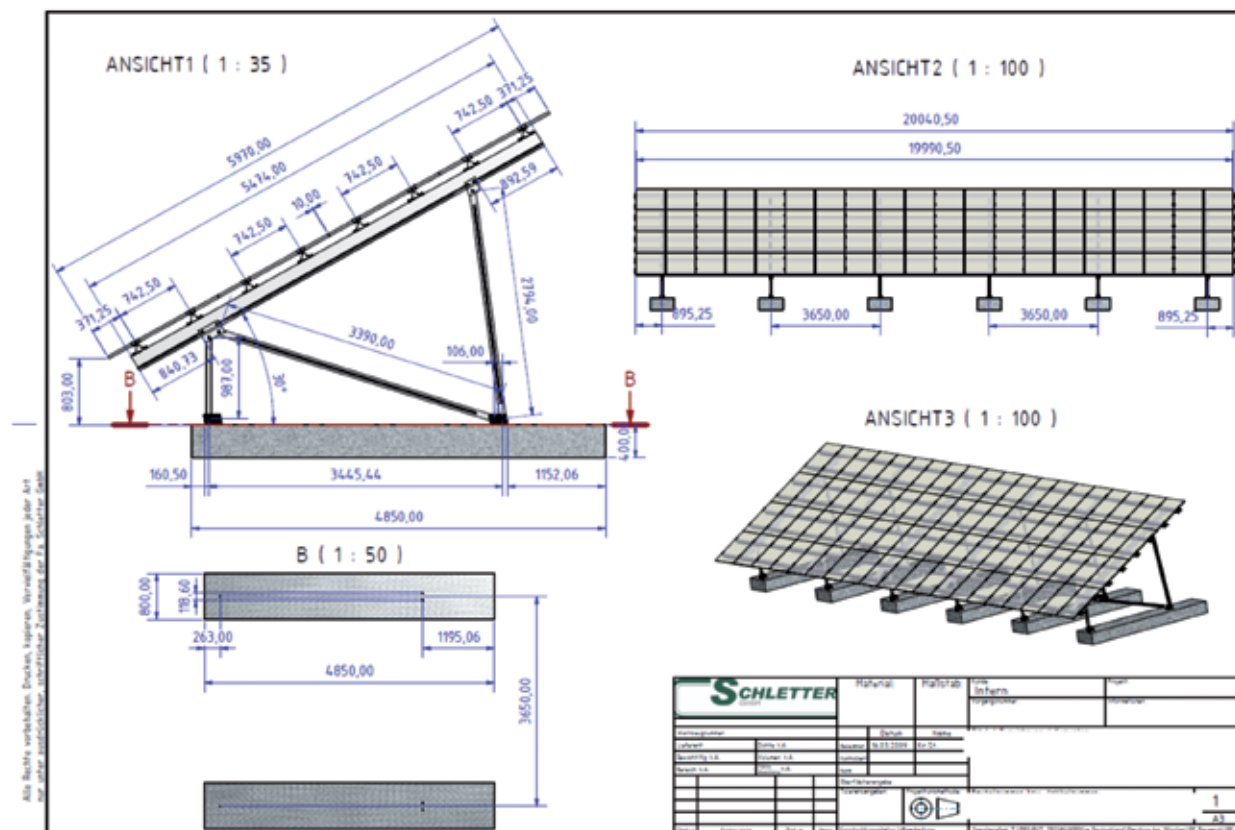


### Example of a normal project planning

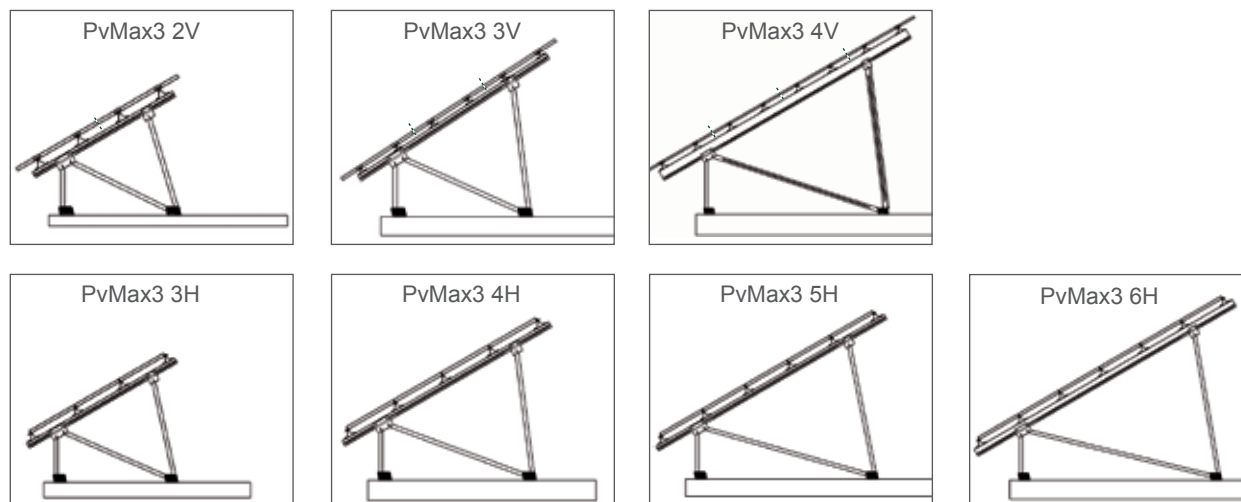
(guiding price offer, if an order is placed a rack drawing will be created)



### Example of a special project planning



## Mounting options

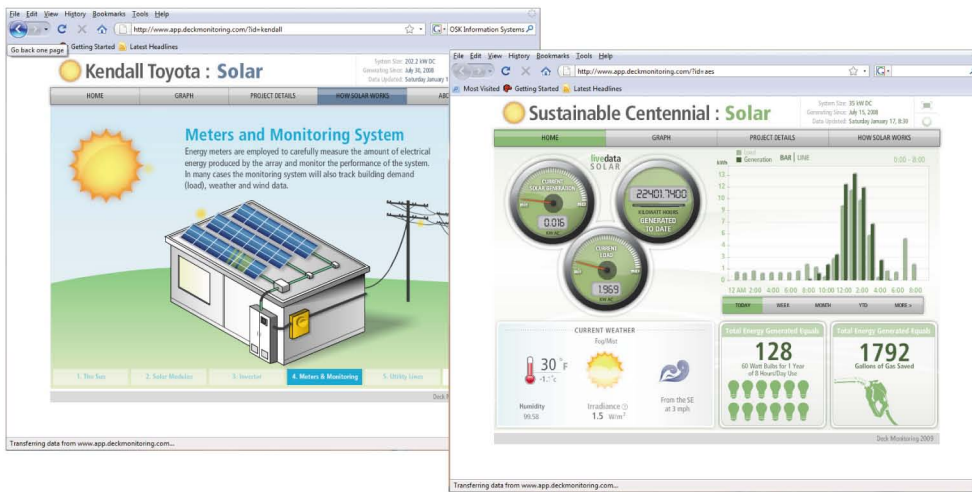


## Technical data

<b>Material</b>	Module bearing profiles: Aluminium - special profiles of the S - series Binders: Aluminium - special profiles of the BF - series Supports: Aluminium - RHP profiles Screws / nuts A2 – 70 / A4 – 80
<b>Foundation</b>	Concrete (The structural analysis of the system features specifications on reinforcement and dimensioning)
<b>Structural analysis</b>	According to the current national standards (in Germany, DIN 1055/ EC 1) Structural analysis with specifications on foundation dimensioning as well as a dowel recommendation depending on the respective wind and snow loads that have to be considered.

**We will be glad to submit you a non-binding offer.**





## FEATURES:

**Revenue Grade System Monitoring** – Utility grade, verifiable data for billing, reporting to agencies, SREC reporting, and analytics.

**Web, Kiosk, and Plasma Display Integration** – Highly customizable and visually interactive web view and optional Kiosk integration. Perfect for integration into websites, store lobbies, and large screen displays.

**Advanced Performance Monitoring** – Our powerful data center allows users to view detailed analysis of system performance. Interactive graphs bring the power to troubleshoot and benchmark systems to the user's fingertips. Our high end data gateway can record a multitude of information including: generation, load, irradiance, volts, amps, cell temperature, weather data, and wind direction / speed.

**Demand Monitoring** – Our demand monitoring package allows you to accurately monitor your facility's energy usage in fifteen minute intervals. The package is fully integrated with the standard flash view including detailed graphing capabilities. This information facilitates energy conservation by identifying high energy use periods.

**System Administration** – Our powerful administration panel allows contractors to quickly get an overview of the performance of all their systems at once (and system owners of their individual systems). Advanced notification options allow you to be notified instantly of errors, alerts and track system performance remotely.

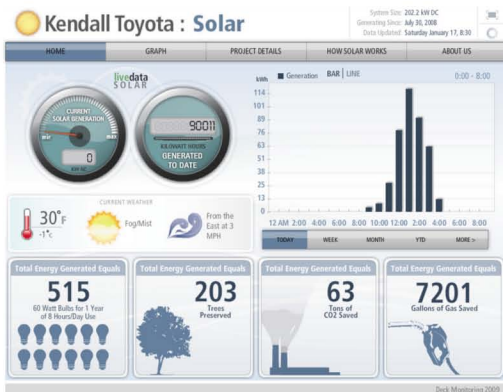
## KEY BENEFITS:

**Customizable** - Easily configurable for customer choice of colors, project information and kiosk integration.

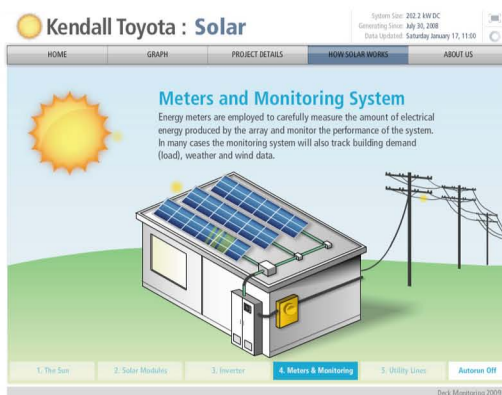
**Integrated Pricing** - The purchasing and installation process is simplified and streamlined. Our basic package includes flash views and contractor admin panels at no extra charge.

**Power and Beauty** – The standard DECK system is a combination of powerful commercial grade features and a stunning user interface. Perfect for public kiosks, web pages, and in-facility displays.

**Customer Service** - Custom alarms ensure installers instantly know about any performance issue. Keep connected to your customer base.



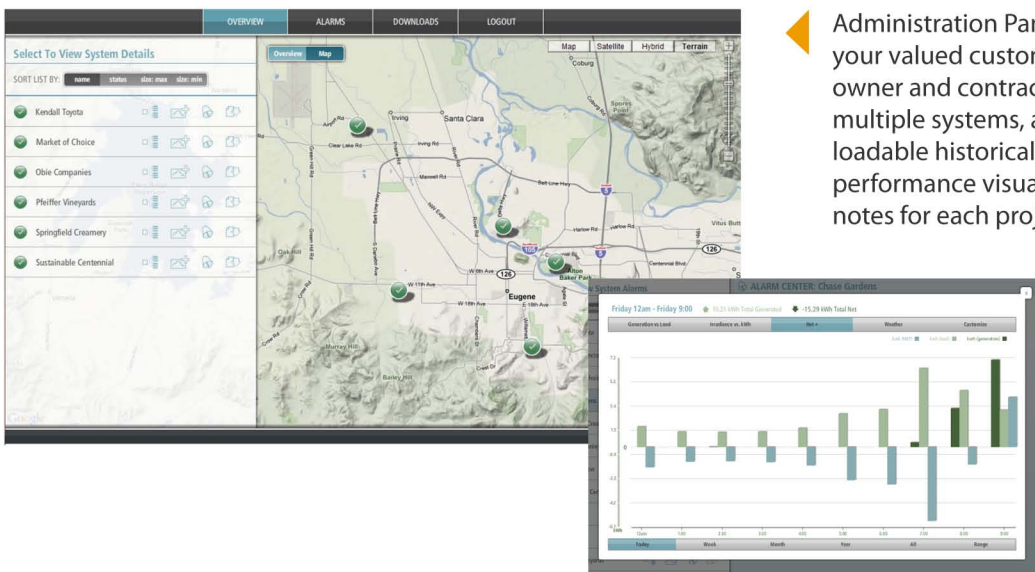
Dashboard - Energy meters display current generation, historical data, weather data, and equivalencies.



Educational Information - Visitors to your website or facility can learn about how your solar system works.



Custom Pages - Each deployment comes standard with custom pages, describing your specific installation and system details.



Administration Panel - Keep track of your valued customers! System owner and contractor access to view multiple systems, alarms, downloadable historical data, advanced performance visualizations, and case notes for each project.





### Sustainable Centennial : Solar

System Size: 34 kW DC  
Generating Since: July 15, 2008  
Data Updated: June 22, 2009 4:30



## KEY MODULES:

**Energy Meters** - Display current solar generation as well as kilowatt hours generated to date.

**Historical Graph** - Display historical graphs of solar generation. Views include detailed daily views, 3 day, weekly, monthly, and yearly graphing options.

**Weather Module** - Display current weather conditions (including irradiance) on site using a compatible DECK weather station, or via the national government weather feed.

**Equivalencies** - Display the equivalent energy which would have been generated or used by other sources. Options include Gasoline, Lightbulbs, Trees, CO<sub>2</sub>, and SREC Credits.

**Customization Options** - Choose your choice of colors, equivalencies, and customizable project details pages. Customization options come standard with our core packages.

## CUSTOM PAGES:

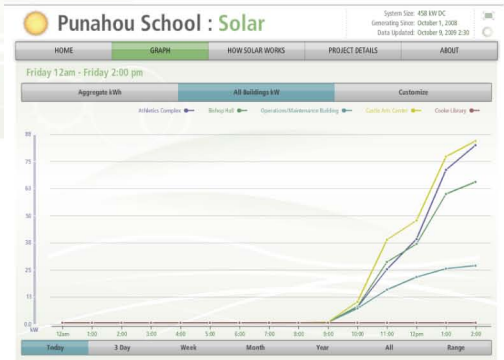
**Company Pages:** Our standard package includes a custom page specific to your installation, which includes photos and text of your choice. Use this page to highlight the green efforts of your company.

**Multiple Installation Integration:** Do you have multiple systems which you would like to integrate into one dashboard? We can easily combine multiple systems into one public display, including graphs which break apart each installations' production (or each inverters' production).



Information specific to your installation

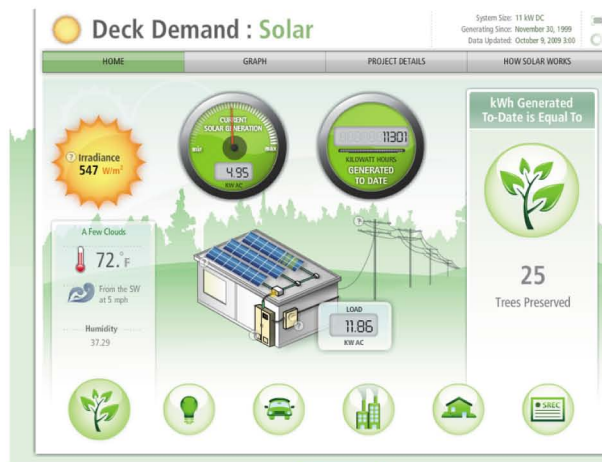
Incorporate multiple installations into one dashboard



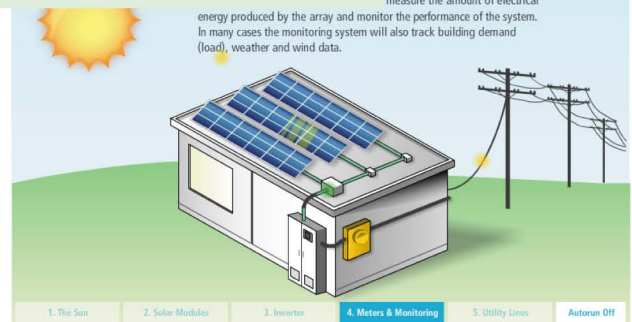
## EDUCATIONAL FEATURES:

**How Solar Works page:** Every dashboard comes standard with a How Solar Works tab. This tab explains the basics of the solar systems components.

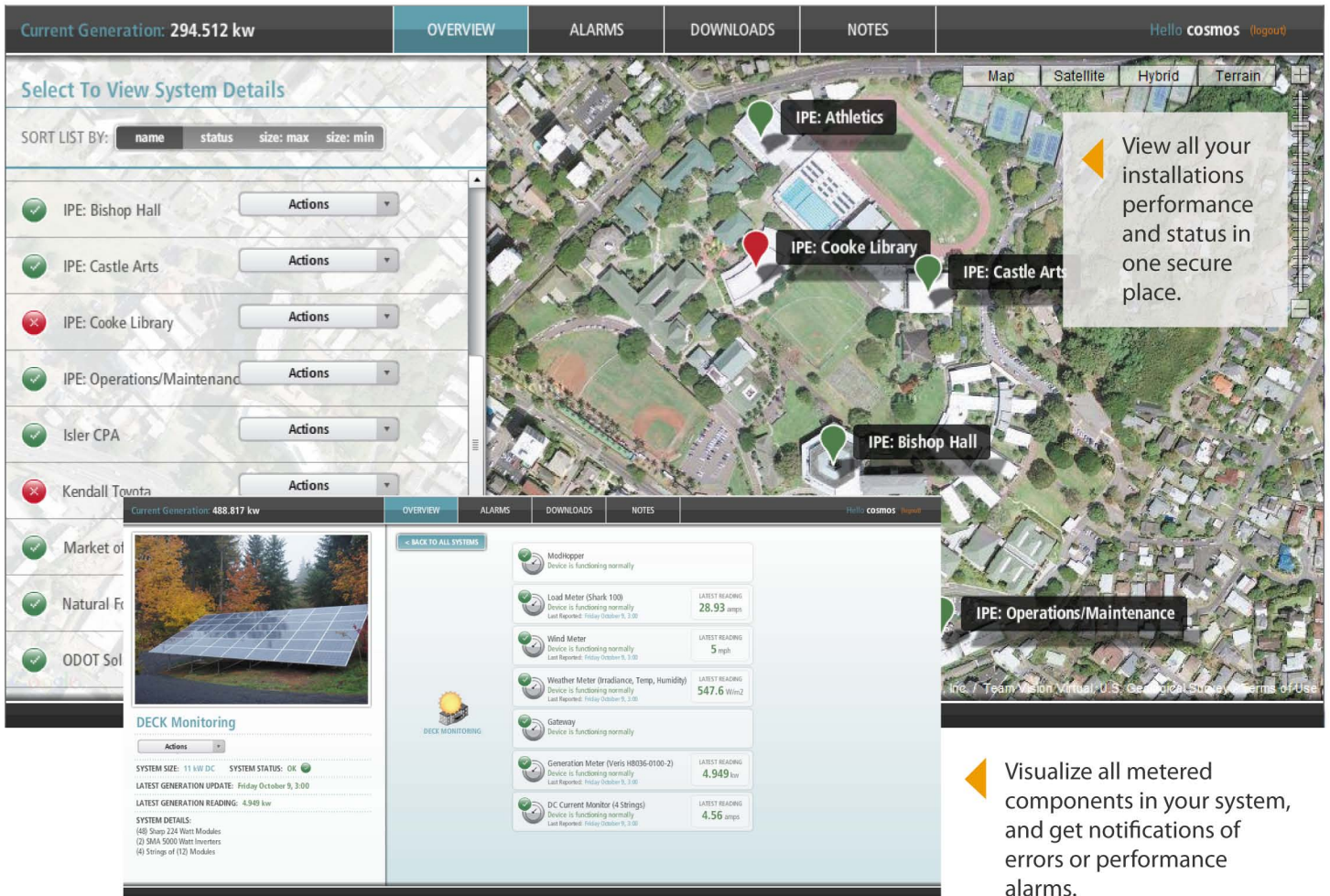
**Educational Dashboard Option:** A highly interactive display which incorporates educational information and is optimized for kiosk or wall mounted touch screen use. Users can see the flow of energy from the sun, through the solar panels, the inverters, the meters, and finally out to the grid. Handy tool tips at each point explain the basics of solar production, and real time data gives users feedback on current conditions. A green equivalency slider offers an easy method to switch between equivalencies - including REC credits!



Interactive educational dashboards and displays







The screenshot displays the DECK Monitoring Admin Panel. At the top, a navigation bar includes 'Current Generation: 294.512 kw', 'OVERVIEW', 'ALARMS', 'DOWNLOADS', 'NOTES', and a user greeting 'Hello cosmos (logout)'. Below this, a 'Select To View System Details' section allows sorting by name, status, size, or max/min. A list of systems is shown, including IPE: Bishop Hall, IPE: Castle Arts, IPE: Cooke Library, IPE: Operations/Maintenance, Isler CPA, and Kendall Towne. To the right, a map shows the locations of these systems with labels like 'IPE: Athletics', 'IPE: Cooke Library', 'IPE: Castle Arts', 'IPE: Bishop Hall', and 'IPE: Operations/Maintenance'. A callout box on the map states: 'View all your installations performance and status in one secure place.' Below the map, a detailed view of the 'IPE: Operations/Maintenance' system is shown, including a photo of solar panels, system size (11 kW DC), status (OK), latest generation update (Friday October 9, 3:00), latest generation reading (4.949 kw), and system details (48 Sharp 224 Watt Modules, 2 SMA 5000 Watt Inverters, 4 Strings of (12) Modules). A 'DECK MONITORING' logo is also present. On the right side of the detailed view, a list of monitored components is shown with their latest readings: Modikopper (Device is functioning normally), Lead Meter (Shark 100) (Device is functioning normally, Latest Reading: 28.93 amps, Last Reported: Friday October 9, 3:00), Wind Meter (Device is functioning normally, Latest Reading: 5 mph, Last Reported: Friday October 9, 3:00), Weather Meter (Irradiance, Temp, Humidity) (Device is functioning normally, Latest Reading: 547.6 W/m2, Last Reported: Friday October 9, 3:00), Gateway (Device is functioning normally), Generation Meter (Veris H8036-0100-2) (Device is functioning normally, Latest Reading: 4.949 kw, Last Reported: Friday October 9, 3:00), and DC Current Monitor (4 Strings) (Device is functioning normally, Latest Reading: 4.56 amps, Last Reported: Friday October 9, 3:00).

Visualize all metered components in your system, and get notifications of errors or performance alarms.

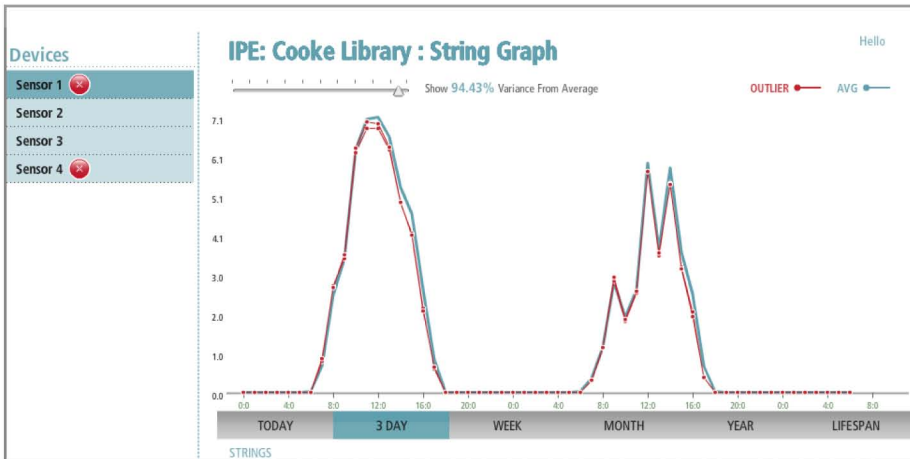
## KEY CAPABILITIES:

**Provide Enhanced Support and Troubleshooting** - The integrator or contractor benefits by being able to keep track of all their valued customers in one place, quickly, and efficiently. Alarms and notices can alert the integrator to potential system problems and outages instantly, and troubleshooting features can save time for both contractor and customer.

**Maximize System Performance** - Be immediately alerted of system performance issues which might go undetected and cause expensive system downtime.

**Agency Reporting and Data Download Center** - Provide automatic transfer of data to utilities in order to receive incentive payments. Certified as a PDP and PMRS in the state of California. The Data Download Center allows users to download data to their desktop at any time in an easy to use format.

**DC String and Subarray Monitoring** - Detailed performance data and visualization down to the string level. View underreporting arrays and strings and identify issues with system performance.



**DC String and Subarray Monitoring** - Detailed performance data and visualization down to the string level. View underreporting arrays and strings and identify issues with system performance.

**Alarms and Notes** - Create custom alarms to notify you or a member of your team in case of performance issues or fault codes from inverters. Take advantage of our hierarchical alarm system to reduce information overload for team members. Make notes specific to systems or alarms. Record who was notified of which alarms, what actions were taken and when those actions were taken. Access a running log of history on any particular system or system alarm.

Current Generation: 294.512 kw

OVERVIEW ALARMS DOWNLOADS NOTES

SHOWING: All Locations

Location	Alarm Name	Alarm Description	Created By
IPE: Bishop Hall	Bishop Hall		
IPE: Cooke Library	Cooke Library	Check monthly system performance	
IPE: Athletics	Athletics Complex	Check monthly system performance	
IPE: Castle Arts	Castle Arts Building		
ODOT Solar Highway	AES - ODOT - Monthly Generation	Check monthly system performance	
IPE: Operations/Maintenance	Operations/Maintenance Building	Check monthly system performance	

**Bishop Hall (IPE: Bishop Hall)**

First Triggered: Thu Oct 1 2009 1:30 Last Triggered: Thu Oct 1 2009 1:30 Duration: 0 hours

NOTES ADD A NOTE ALARM SETTINGS SEE WHO WAS NOTIFIED ALARM LOG

**Update Alarm Settings**

SAVE

ALARM NAME: Bishop Hall

ALARM DESCRIPTION: Check monthly system performance against expected production.



**Inverter and Device Data** - Instant access to performance data directly from the inverter. DECK Monitoring is compatible with most commonly used commercial inverters. In addition our system views give the user instant visibility to each device which is reporting to the system.



### DECK HARDWARE:

**Components:** The standard DECK Monitoring solution is comprised of a data gateway which is mounted on site. This data gateway communicates with supplied meters and data gathering hardware which connects via Modbus, Pulse, or wireless signals. Typically the included CT Meter is used to measure system generation after the inverter on the AC side.

**Revenue Grade and Extendable:** Our hardware components were selected for future expandability, high resolution data and low failure rates. Our system components can be incorporated into other third party systems down the road. In the future, if you would like to add demand monitoring capabilities, integrate with other EMS systems, add another array, weather station, string monitoring solutions or countless other components, you can use the same hardware and you will not have to replace the core components of the system.

### KEY HARDWARE CAPABILITIES:

Choice of meters

Demand (load) metering options

Plug and play with third party components

Expandable platform

Wireless (cellular) connectivity options

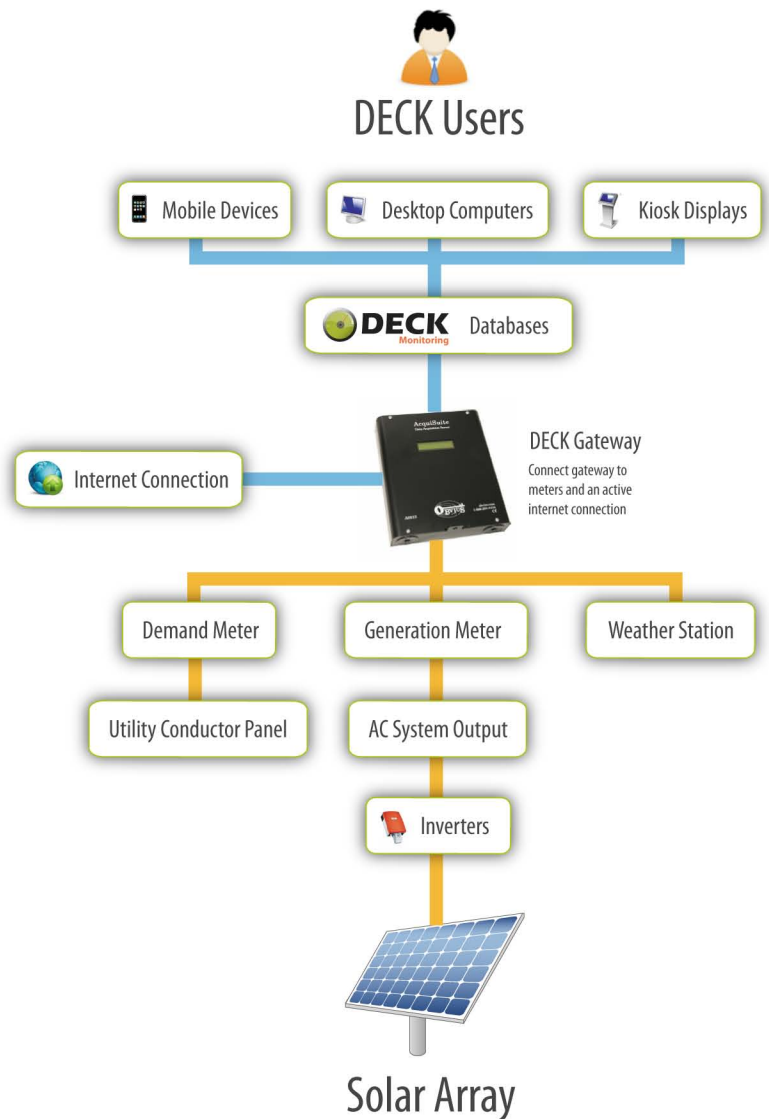
String monitoring options

String combiner box integration

Data backup stored onsite in hardware

Revenue grade data

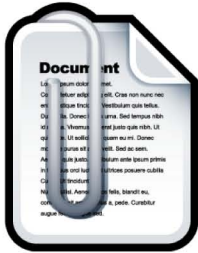
Inverter communication capabilities



### EASY INSTALLATION:

The DECK Monitoring platform is designed around plug and play connectivity, and proven communication standards. Mount the gateway to the wall in the facility, connect the internet to the gateway, and install our CT meters to get up and running. We offer a choice of CT meters for our customers including split core Veris CT meters and Shark Electro Industries CT meters.





### STEP 1: GET QUOTE

We can provide you with our standard price sheet, making it easy to price your system on your own. If you have any questions about our solutions or how to price them, contact our sales team and we will generate a custom quote for you or your client.



### STEP 2: PLACE ORDER

Place an order with us directly, or with one of our distribution partners. You will be given the same quality service and equipment either way.



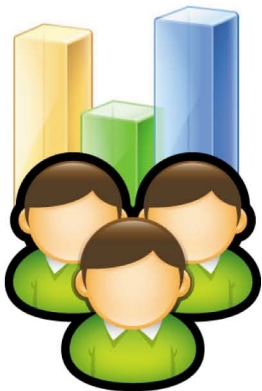
### STEP 3: SITE SURVEY FORM

As soon as you place an order we will send you a link to our online site survey form. The site survey form will give us the necessary information to customize the hardware and software for your specific project. If there is any other needed information, we will contact you directly.



### STEP 4: SHIPMENT

We will pre-configure your hardware and software so it is ready to install, and then drop ship your equipment to your specified shipping address. Standard solutions may ship within two to three weeks. Custom solutions may take longer depending on wait times for hardware.



### STEP 5: Installation

When your team receives the equipment onsite, the software will already be deployed. At this point once the hardware is connected and configured, the installation will be complete.

## APPENDIX C: MADEP Post-Closure Application



Massachusetts Department of Environmental Protection  
Bureau of Waste Prevention – Solid Waste Management  
**BWP SW 36 Post-Closure Use – Major**  
**BWP SW 37 Post-Closure Use – Minor**  
Application for Post-Closure Use Permit

Transmittal Number \_\_\_\_\_

Facility ID# (if known) \_\_\_\_\_

**B. Project Information (cont.)**

	Plan/Report #	Page #	DEP Use Only
2. Additional plan/reports for constructing permanent structures on filled areas:			
a. settlement analysis			
(1) waste characteristic - refuse, depth, age composition, etc.	_____	_____	
(2) settlement monitoring - preloading, test fills surveys, etc.	_____	_____	
b. design considerations			
(1) differential settlement	_____	_____	
(2) gas control/monitoring in structures	_____	_____	
(3) final cover penetrations/integrity	_____	_____	
(4) utility connections	_____	_____	

**C. Permit Review Documentation and Criteria**

**Note:** Complete all sections applicable to requested post closure use. Refer to referenced regulation citation for applicability. Enter NA if not applicable.

	Plan/Report #	Page #	
1. Documentation:			
a. wetlands order of conditions	_____	_____	
b. financial assurance estimate and mechanism (310 CMR 19.051)	_____	_____	
2. Permit criteria:			
a. (310 CMR 19.038(1)(d)) (all facilities)			
(1) MEPA compliance	_____	_____	
(2) sight assignment limits	_____	_____	
(3) compliance with facility specific regulations	_____	_____	
(4) health & environmental impact assessment	_____	_____	



Massachusetts Department of Environmental Protection  
Bureau of Waste Prevention – Solid Waste Management  
**BWP SW 36 Post-Closure Use – Major**  
**BWP SW 37 Post-Closure Use – Minor**  
Application for Post-Closure Use Permit

Transmittal Number \_\_\_\_\_

Facility ID# (if known) \_\_\_\_\_

**C. Permit Review Documentation and Criteria (cont.)**

	Plan/Report #	Page #	DEP Use Only
(5) compliance with other applicable laws and regulations	_____	_____	_____
(6) enforcement status	_____	_____	_____
(7) structural support	_____	_____	_____
b. 310 CMR 19.143(3) (landfills only)			
(1) final contour changes	_____	_____	_____
a. no adverse impacts	_____	_____	_____
b. reduce threats	_____	_____	_____
(2) integrity of final cover	_____	_____	_____
(3) drainage/erosion controls	_____	_____	_____

**D. Certification: 310 CMR 19.011**

Any person, required by these regulations or any order issued by the Department, to submit papers shall identify themselves by name, profession, and relationship to the applicant and legal interest in the facility, and make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties both civil and criminal for submitting false information including possible fines and imprisonment."

\_\_\_\_\_  
Print Name

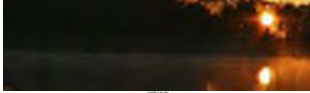
\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Position/Title

\_\_\_\_\_  
Date

## APPENDIX D: MADEP Fast-Track Permitting Process



[Skip Navigation](#)[MassDEP Home](#)[Mass.Gov Home](#)[State Agencies](#)[State Online Services](#)[site map](#) [contacts](#) [search:](#)[dep home](#) > [service center](#) > [permits, reporting & forms](#) > [getting started](#) > [fast track permitting](#)**About MassDEP****Public Participation & News****Air & Climate****Water, Wastewater & Wetlands****Waste & Recycling****Toxics & Hazards****Cleanup of Sites & Spills****Service Center**

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- :: **[permits, reporting & forms](#)**
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- :: [compliance assistance](#)
- :: [environmental results program](#)
- :: [enforcement & appeals](#)
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- [Calendar](#)
- [My Community](#)
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- [Report Pollution](#)

**Section 40 Overview & Project Requirements - Fast Track Permitting**

Section 40 of the Commonwealth's Fiscal Year 2005 budget (Chapter 149 of the Acts of 2004) creates a trust fund, the Special Projects Permitting and Oversight Fund, at the Department of Environmental Protection. The authorization broadens the range of projects that are eligible for an alternative permit schedule or individual rule agreement and provides MassDEP with additional authority to negotiate permit schedules and fees for projects that the Commissioner determines are of significant environmental interest to the Commonwealth or are consistent with sustainable development principles.

While previously authorized by MassDEP's fee statute, c. 21A section 18, negotiated alternative fees collected for complex, technically difficult or large projects went to the General Fund and were not accessible by MassDEP to meet the additional requirements negotiated with an applicant as part of an alternative schedule or individual rule project agreement. The new authorization provides MassDEP with a mechanism to receive and utilize the fees negotiated for such projects. The fund also offers project proponents and MassDEP the opportunity to support projects in economically distressed areas of the Commonwealth as the fund language allows MassDEP to retain fees in excess of its expenditures for that purpose. Specifics on the implementation of Section 40 are contained in the guidelines that follow.

**Guidelines for Implementing Section 40 of c.149 of the Acts of 2004 (Fast Track)**

1. When implementing the provisions of Section 40, the department must determine that each project meets one or more of the following project requirements.

**Project Requirements.**

- A. Projects meet the preexisting criteria of clauses (1) and (2) in subsection (d) of section 18 of chapter 21A. They include:
  - o projects for which general fees and schedules cannot be established by general rule based upon the size, novelty, complexity or technical difficulty of the project; or
  - o projects that based on their size, novelty, complexity, or technical difficulty will require twice as much work by the department to process as that assumed as the basis for establishing an existing permit application fee and cannot be completed within regular schedule for timely action applicable to that fee.
- B. Projects are determined by the Commissioner to be of significant environmental interest to the Commonwealth. Projects that are of significant environmental interest include:
  - o projects that are part of a Supplemental Environmental Project approved by MassDEP;
  - o projects that are part of a site remediation or restoration under c.21E, the Federal Superfund, or a MassDEP enforcement action/order;
  - o projects that could have a significant impact upon an important environmental resource if not properly regulated;
  - o projects that are required in order to meet federal environmental rules or commitments, are part of a court settlement, or are required to mitigate previous environmental problems; or
  - o projects that need to adhere to specific deadlines in order to avoid harm to the environment, a resource area, or an endangered or threatened specie.
- C. Projects that are consistent with sustainable development principles. They include projects that meet one or more of the following sustainable development principles.

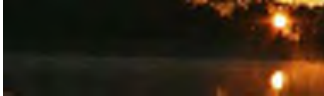
- REDEVELOPMENT FIRST. Support the revitalization of community centers and neighborhoods. Encourage reuse and rehabilitation of existing infrastructure rather than the construction of new infrastructure in undeveloped areas. Give preference to redevelopment of brownfields, preservation and reuse of historic structures and rehabilitation of existing housing and schools.
  - CONCENTRATE DEVELOPMENT. Support development that is compact, conserves land, integrates uses, and fosters a sense of place. Create walkable districts mixing commercial, civic, cultural, educational and recreational activities with open space and housing for diverse communities.
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  - CONSERVE NATURAL RESOURCES. Increase our supply of renewable energy and reduce waste of water, energy and materials. Lead by example and support conservation strategies, clean power and innovative industries. Construct and promote buildings and infrastructure that use land, energy, water, and materials efficiently.
  - EXPAND HOUSING OPPORTUNITIES. Support the construction and rehabilitation of housing to meet the needs of people of all abilities, income levels, and household types. Coordinate the provision of housing with the location of jobs, transit, and services. Foster the development of housing, particularly multifamily, that is compatible with a community's character and vision.
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2. In addition to ensuring that projects included as part of the Special Projects Permitting and Oversight Fund meet at least one of the above project criteria, the department shall negotiate fees that are intended to cover the cost of the project to the department to the maximum extent possible. In instances where this is not possible, the department shall seek to recover a comparable portion of the project's cost relative to projects permitted using the standard timelines and fees promulgated in 310 CMR 4.00.

The Department shall maintain the project documentation and accounting information

necessary to determine whether the resources received from a project proponent cover the cost of the project to the Department during the time period of the project. The Department shall periodically review this information to determine what portion of the department's cost is recovered for projects authorized under section 40. This information shall be provided to the Advisory Committee on Fees and Program Improvements, or any other interested party, as requested in order to ensure that the permitting resources of the Department are allocated in a fair and equitable manner among the Department's various permitting activities.



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Fast Track Permitting incorporates a set of sound environmental policies and procedures that promote smart growth and economic development across the Commonwealth. It helps businesses get answers faster while ensuring protection of our natural resources.

**Fast Track Projects**

Some of the types of Fast Track projects include:

- Biotech
- Energy
- Transit-oriented development
- Brownfield redevelopment
- Solid waste recycling facilities
- Smart growth projects

**How It Works**

In order to be authorized for Fast Track, project proposals are submitted to your Regional Director (see contacts above). The director will work with the Commissioner's Office of Operations and Programs to develop the necessary project agreement.

Once an agreement is signed, the project applicant can begin working with the MassDEP project manager assigned to the project.

**Benefits**

Fast Track guarantees:

- Expedited administrative and technical reviews for all eligible projects.
- Negotiated permit schedules and fees.
- A single point of contact through the entire permitting process.

**For more information:****Contacts**

Northeast Region, Wilmington  
Richard Chalpin, Regional Director  
[Richard.Chalpin@state.ma.us](mailto:Richard.Chalpin@state.ma.us)  
978-694-3345

Southeast Region, Lakeville and Hyannis  
Gary Moran, Regional Director  
[Gary.Moran@state.ma.us](mailto:Gary.Moran@state.ma.us)  
508-946-2712

Western Region, Springfield  
Michael Gorski, Regional Director  
[Michael.Gorski@state.ma.us](mailto:Michael.Gorski@state.ma.us)  
413-755-2213

Central Region, Worcester  
Martin Suuberg, Regional Director  
[Martin.Suuberg@state.ma.us](mailto:Martin.Suuberg@state.ma.us)  
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- Protection of natural resources and promotion of smart growth.

**Costs involved**

The cost of fast tracking a project is determined by the number and complexity of the permits. This includes review determinations, stakeholder communications and other oversight activities. Project proponents will work with the MassDEP project manager to draft a memorandum of agreement (MOA) outlining the deliverables and a fee schedule.

**Project qualifications**

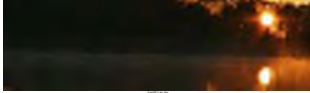
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## APPENDIX E: MADEP Presentations And Fact Sheets

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**Section 40 Overview & Project Requirements - Fast Track Permitting**

Section 40 of the Commonwealth's Fiscal Year 2005 budget (Chapter 149 of the Acts of 2004) creates a trust fund, the Special Projects Permitting and Oversight Fund, at the Department of Environmental Protection. The authorization broadens the range of projects that are eligible for an alternative permit schedule or individual rule agreement and provides MassDEP with additional authority to negotiate permit schedules and fees for projects that the Commissioner determines are of significant environmental interest to the Commonwealth or are consistent with sustainable development principles.

While previously authorized by MassDEP's fee statute, c. 21A section 18, negotiated alternative fees collected for complex, technically difficult or large projects went to the General Fund and were not accessible by MassDEP to meet the additional requirements negotiated with an applicant as part of an alternative schedule or individual rule project agreement. The new authorization provides MassDEP with a mechanism to receive and utilize the fees negotiated for such projects. The fund also offers project proponents and MassDEP the opportunity to support projects in economically distressed areas of the Commonwealth as the fund language allows MassDEP to retain fees in excess of its expenditures for that purpose. Specifics on the implementation of Section 40 are contained in the guidelines that follow.

**Guidelines for Implementing Section 40 of c.149 of the Acts of 2004 (Fast Track)**

1. When implementing the provisions of Section 40, the department must determine that each project meets one or more of the following project requirements.

**Project Requirements.**

- A. Projects meet the preexisting criteria of clauses (1) and (2) in subsection (d) of section 18 of chapter 21A. They include:
  - o projects for which general fees and schedules cannot be established by general rule based upon the size, novelty, complexity or technical difficulty of the project; or
  - o projects that based on their size, novelty, complexity, or technical difficulty will require twice as much work by the department to process as that assumed as the basis for establishing an existing permit application fee and cannot be completed within regular schedule for timely action applicable to that fee.
- B. Projects are determined by the Commissioner to be of significant environmental interest to the Commonwealth. Projects that are of significant environmental interest include:
  - o projects that are part of a Supplemental Environmental Project approved by MassDEP;
  - o projects that are part of a site remediation or restoration under c.21E, the Federal Superfund, or a MassDEP enforcement action/order;
  - o projects that could have a significant impact upon an important environmental resource if not properly regulated;
  - o projects that are required in order to meet federal environmental rules or commitments, are part of a court settlement, or are required to mitigate previous environmental problems; or
  - o projects that need to adhere to specific deadlines in order to avoid harm to the environment, a resource area, or an endangered or threatened specie.
- C. Projects that are consistent with sustainable development principles. They include projects that meet one or more of the following sustainable development principles.

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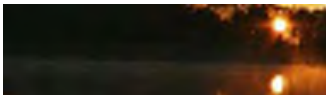
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Richard Chalpin, Regional Director  
[Richard.Chalpin@state.ma.us](mailto:Richard.Chalpin@state.ma.us)  
978-694-3345

Southeast Region, Lakeville and Hyannis  
Gary Moran, Regional Director  
[Gary.Moran@state.ma.us](mailto:Gary.Moran@state.ma.us)  
508-946-2712

Western Region, Springfield  
Michael Gorski, Regional Director  
[Michael.Gorski@state.ma.us](mailto:Michael.Gorski@state.ma.us)  
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Massachusetts Department of Environmental Protection  
Bureau of Waste Prevention – Solid Waste Management  
**BWP SW 36 Post-Closure Use – Major**  
**BWP SW 37 Post-Closure Use – Minor**  
Application for Post-Closure Use Permit

Transmittal Number \_\_\_\_\_

Facility ID# (if known) \_\_\_\_\_

**B. Project Information (cont.)**

	Plan/Report #	Page #	DEP Use Only
2. Additional plan/reports for constructing permanent structures on filled areas:			
a. settlement analysis			
(1) waste characteristic - refuse, depth, age composition, etc.	_____	_____	
(2) settlement monitoring - preloading, test fills surveys, etc.	_____	_____	
b. design considerations			
(1) differential settlement	_____	_____	
(2) gas control/monitoring in structures	_____	_____	
(3) final cover penetrations/integrity	_____	_____	
(4) utility connections	_____	_____	

**C. Permit Review Documentation and Criteria**

**Note:** Complete all sections applicable to requested post closure use. Refer to referenced regulation citation for applicability. Enter NA if not applicable.

	Plan/Report #	Page #	
1. Documentation:			
a. wetlands order of conditions	_____	_____	
b. financial assurance estimate and mechanism (310 CMR 19.051)	_____	_____	
2. Permit criteria:			
a. (310 CMR 19.038(1)(d)) (all facilities)			
(1) MEPA compliance	_____	_____	
(2) sight assignment limits	_____	_____	
(3) compliance with facility specific regulations	_____	_____	
(4) health & environmental impact assessment	_____	_____	



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**C. Permit Review Documentation and Criteria (cont.)**

	Plan/Report #	Page #	DEP Use Only
(5) compliance with other applicable laws and regulations	_____	_____	_____
(6) enforcement status	_____	_____	_____
(7) structural support	_____	_____	_____
b. 310 CMR 19.143(3) (landfills only)			
(1) final contour changes	_____	_____	_____
a. no adverse impacts	_____	_____	_____
b. reduce threats	_____	_____	_____
(2) integrity of final cover	_____	_____	_____
(3) drainage/erosion controls	_____	_____	_____

**D. Certification: 310 CMR 19.011**

Any person, required by these regulations or any order issued by the Department, to submit papers shall identify themselves by name, profession, and relationship to the applicant and legal interest in the facility, and make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties both civil and criminal for submitting false information including possible fines and imprisonment."

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Position/Title

\_\_\_\_\_  
Date



# Renewable Energy at Closed Landfills Workshop:

## *Landfill Post Closure Use Permitting Guidelines*

January 19, 2010

Daniel Hall, Solid Waste Section Chief  
Massachusetts Department of Environmental Protection

**MassDEP**

Massachusetts Department of Environmental Protection

# Universe of Landfills

- Active Landfills
  - ✓ tend to be large private sites.
- Landfills that have been assessed and closed (capped/final cover).
  - ✓ larger landfills, risks and closure design aspects are known.
  - ✓ majority were municipal operations.
  - ✓ generally, ready to move forward.
- “Outliers” (old landfills, dumping grounds that have not been assessed or closed).

## “Outliers”

- Tend to be smaller sites.
- Must be assessed and closed either before or during redevelopment.
  - ✓ Need to ensure that funds and time will be available.
- If you have an Outlier be **Proactive** and **MANAGE YOUR RISKS.**
- Development next to or on Outliers may trigger requirements for the owner/operator to start the assessment and closure process.

# Getting Started

## 1. Review Existing Approvals and Permits

- Site Assignment
- Previous MEPA certificates
- Closure Plans & Assessment



## 2. Identify the Approvals Needed



- Post Closure Use Permit
- Massachusetts Environmental Policy Act (MEPA)
  - ✓ Thresholds (energy, impervious surface, etc.)
  - ✓ change to an existing solid waste project
  - ✓ state financial assistance
- Local Permits
  - ✓ wetlands, zoning, building, etc.

### 3. Set up a Pre-application Meeting with MassDEP

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#### Solid Waste Management Section Chiefs

- Southeast Regional Office: David B. Ellis,  
(508-946-2833), [Dave.Ellis@state.ma.us](mailto:Dave.Ellis@state.ma.us)
- Northeast Regional Office: John Carrigan,  
(978-694-3299), [John.Carrigan@state.ma.us](mailto:John.Carrigan@state.ma.us)
- Central Regional Office: Lynne Welsh,  
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(413-755-2212), [Daniel.Hall@state.ma.us](mailto:Daniel.Hall@state.ma.us)

**MassDEP**

Massachusetts Department of Environmental Protection

## 4. Submit a Post Closure Permit Application

- Who can complete the permit application?
  - ✓ Registered Massachusetts Professional Engineer with Owner's Approval
- Major Post Closure Use Permit Application
  - ✓ Agency review typically takes 2-6 months
  - ✓ Can take much longer if no previous assessment or closure at proposed site
- MassDEP Review Criteria
  - ✓ Maintain integrity of final cover system
  - ✓ No adverse impacts to public health, safety, welfare and the environment

# Critical Application Components

- What the DEP permit reviewer will be most focused on;
  - ✓ Foundations
  - ✓ Stormwater Controls
  - ✓ Long-Term Maintenance



# Foundations

- Must not compromise the function of landfill cap/final cover system; keeps water out and landfill gas in.
- Must be geotechnically stable and designed to accommodate loading/settlement.
- Chosen design and density of development will directly impact considerations for both stormwater management and long-term maintenance.

# Stormwater Controls

- Consider:
  - ✓ the foundation design and density of development.
  - ✓ location and orientation of power lines from development.
  - ✓ Will these factors concentrate runoff and erosion potential or create water bars?
- Design for the 24-hour, 25 year storm event.
- Evaluate flooding potential from the 24-hour, 100 year storm event.

# Long-Term Maintenance

- Maintenance ensures the continued functionality of the cap/final cover system and all of its components.
  - ✓ Designed well: Maintenance should be minimal.
  - ✓ Designed poorly: may need efforts to address instability, frequent erosion/cap repairs, and/or labor intensive vegetation control.

# Supporting Materials

- Existing Site Conditions
  - ✓ Site plans (likely on-file at MassDEP)
  - ✓ Report (narrative)
  - ✓ Findings (I.D. any baseline issues)
- Proposed Post Closure Design Plans
  - ✓ Site plans and design details (P.E. stamped/sealed)
  - ✓ Narrative Report that describes:
    - Technical analysis of proposal
    - Effect of changes

## Post-Closure Use Permit Application: The Bottom Line

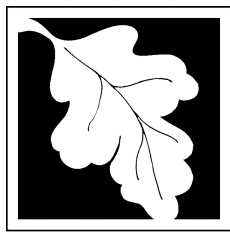
- If your application clearly demonstrates that the proposed development:
  - ✓ Integrates well with the function of the landfill cap/final cover;
  - ✓ Does not pose increased erosion potential;
  - ✓ Provides adequate maintenance; and
  - ✓ Does not create new exposure pathways to landfill gas or leachate.

Then review of your application should proceed favorably.



# Resources

- How MassDEP permitting works?  
<http://www.mass.gov/dep/service/online/gettings.htm>
- Post Closure Use Instructions and Application Form  
<http://www.mass.gov/dep/recycle/approvals/swforms.htm#postclos>
- Landfill Technical Guidance Manual  
<http://www.mass.gov/dep/recycle/laws/policies.htm>
- Control of Odorous Gas at Massachusetts Landfills  
<http://www.mass.gov/dep/recycle/laws/policies.htm>
- 310 CMR 19.000 Solid Waste Regulations  
<http://www.mass.gov/dep/recycle/laws/regulati.htm#sw>
- 301 CMR 11.00 MEPA Regulations  
<http://www.mass.gov/envir/mepa/thirdlevelpages/meparegulations/meparegulations.htm>
- Fact sheet: Developing Renewable Energy Facilities on Closed Landfills  
<http://www.mass.gov/dep/energy/landfill.htm>



Massachusetts  
Department  
of  
ENVIRONMENTAL  
PROTECTION

## fact sheet

### Developing Renewable Energy Facilities on Closed Landfills

*The Massachusetts Department of Environmental Protection (MassDEP) encourages post-closure use of landfills as long as the use will not compromise the environmental protection afforded by the landfill cap and closure. While capped and closed landfills may not be appropriate sites for residential or commercial development, they may be appropriate sites for the installation of photovoltaic panels or wind turbines, which generate renewable energy and may provide income for landfill owners. This fact sheet describes MassDEP's permit requirements and process for obtaining a post-closure use permit for these activities.*

#### Getting Started

➤ **Determine if any existing permits or limitations preclude, prevent or limit post-closure activity at the landfill, including:**

- The landfill's site assignment issued by the local Board of Health
- MassDEP's approval of the landfill's closure plan and closure certification approval (issued for landfills closed after 1990)

If the landfill was not closed and capped in accordance with a MassDEP approval, or was closed and capped before 1990, an environmental assessment (required by 310 CMR 19.050) and other closure activities (required by 310 CMR 19.140) may be required. These activities may be done concurrently with the post closure development of the site, provided that development is done in accordance with a MassDEP approval to proceed.

This information should be available at the appropriate MassDEP Regional Office [Find your region at [www.mass.gov/dep/about/regional.htm](http://www.mass.gov/dep/about/regional.htm)] or from the owner or operator of the landfill. Approved site assignments can be obtained from the local Board of Health

➤ **Identify the environmental permits that may be required:**

*A Solid Waste Post-Closure Use Permit (MassDEP)*

- A Major Post-Closure Use Permit (BWPSW36) is required if the planned renewable energy facility would involve construction of a structure or installation of equipment on or into the landfill's capping system. This includes any activity that would alter or impact the cap, such as constructing a footing or foundation. Otherwise a Minor Post-Closure Use Permit (BWPSW37) is required. (See 310 CMR 19.143)
- See the next page for further guidance on post-closure use requirements

*A Wetlands Notice of Intent (NOI) and Order of Conditions (Local Conservation Commission)*

- At a minimum file a Request for Determination of Applicability to determine if the project will come under the Wetlands Protection Act. If so, a Wetlands NOI and Order of Conditions would be required if construction and/or operation of the proposed renewable energy installation will alter land within a fresh or coastal wetland, marsh, swamp, riverfront area; is located on land subject to flooding; or is located within the buffer zone (100 feet) of a wetland. (See 310 CMR 10.00 and M.G.L. 131 Section 40).

Massachusetts Department of  
Environmental Protection  
One Winter Street  
Boston, MA 02108-4746

Commonwealth of  
Massachusetts  
Deval L. Patrick, Governor

Executive Office of  
Energy & Environmental Affairs  
Ian A. Bowles, Secretary

Department of  
Environmental Protection  
Laurie Burt, Commissioner

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June 2009  
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alternate format by calling our  
ADA Coordinator at  
(617) 574-6872.



*A Massachusetts Environmental Policy Act (MEPA) filing may be required if the project exceeds certain thresholds (Executive Office of Energy and Environmental Affairs, MEPA Unit <http://www.mass.gov/envir/mepa>)*

- For example, MEPA requires filing an Environmental Notification Form if a proposed renewable energy installation will generate 25 or more megawatts of electricity, or construction will require alteration of one or more acres of bordering vegetated wetland, ten or more acres of any other wetland area (including land altered to install roads and utilities), or disturbance of designated priority habitat for state-listed endangered or threatened species. (See 301 CMR 11.03 for the complete list of the MEPA review thresholds)

*Other local permits (zoning, special use, etc.) may be required. Consult the municipality in which the landfill is located.*

- **Schedule a pre-application meeting with the Solid Waste Section in the appropriate MassDEP Regional Office.** See contacts at the end of this fact sheet.

### **Applying for a MassDEP Solid Waste Post-Closure Use Permit**

Prepare and submit a BWP SW 36 Permit Application Form, using the checklist below to ensure your application is complete.

#### **Obtain the following from MassDEP files or the landfill owner/operator:\***

- ✓ Site plan, site assignment limits and abutting properties within a 500-foot radius
- ✓ Landfill closure/cap design plan
- ✓ Existing storm water drainage/runoff control plan
- ✓ Existing landfill gas control/monitoring plan
- ✓ Description of the existing environmental monitoring at the landfill
- ✓ Description of all existing utilities
- ✓ Wetlands Notice of Intent and Order of Conditions, and MEPA finding if required.

\*If unavailable from these sources, the applicant will need to provide this information.

#### **Provide the following information on the project and expected landfill impacts:**

- ✓ A description of all features, equipment and activity associated with the proposed renewable energy development project.
- ✓ Storm water erosion control plan for the construction and operation of the project
- ✓ A description of the existing waste mass (i.e. type, depth, etc) the potential for differential settlement, and potential effects on the post-closure use as well as an analysis of the stability of all structures and reinforcement necessary to build on the landfill cap and side slopes.
- ✓ A description of any proposed alterations to the landfill gas control system and safeguards employed to prevent landfill gas build-up
- ✓ A description of any modifications that will be needed for the landfill's environmental monitoring system, focusing on the landfill gas monitoring system.
- ✓ A description of the development's interface with the landfill's capping system, particularly where the installation will lie upon or penetrate the landfill cap.
- ✓ A description of utilities proposed to be installed (including proposed connections to the utility grid for renewable energy projects)
- ✓ A qualitative (and, if needed, quantitative) assessment of the public health risks that may be posed by the construction, installation, operation and maintenance of the development, for site workers, neighbors, and other people who may be affected by the project.
- ✓ A description of the activities that the owner/operator of the post-closure development will undertake to maintain the integrity of the landfill capping system.
- ✓ A description of the financial assurance instrument that will provide for care and maintenance of the landfill capping system into the future

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Note: If the proposed development will not involve construction of a structure or installation of equipment or activity on or into the landfill's capping system, a "Minor" post-closure use permit (BWP SW 37) may be used. Some of the information described above will not be required for a BWP SW 37 application. The specific permit that a post-closure use will need will be identified in a pre-application meeting with staff in the MassDEP Regional Office.

#### Timelines\* for Issuing a MassDEP Post-Closure Use Permit (BWP SW 36 or 37)

Review Process	Major Post-Closure Use (BWP SW 36)	Minor Post-Closure Use (BWP SW 37)
Administrative Review	24 days	24 days
Technical Review 1	72 days	20 days
Technical Review 2**	72 days	20 days

\*From date of submittal. \*\*After any deficiencies have been corrected by the applicant.

#### More Information

- All Permit Application Forms and Instructions:  
[www.mass.gov/dep/service/online/forms.htm](http://www.mass.gov/dep/service/online/forms.htm)
- Solid Waste Permit Application Forms:  
[www.mass.gov/dep/recycle/approvals/swforms.htm](http://www.mass.gov/dep/recycle/approvals/swforms.htm)
- Landfill Post-Closure Use Permitting Guidelines:  
<http://www.mass.gov/dep/energy/landfill.htm>
- MassDEP Regional Solid Waste Section Contacts  
Find your region at: <http://www.mass.gov/dep/about/regional.htm>

Central Region (Worcester) - Lynne Welsh, 508-849-4007  
Northeast Region (Wilmington) - John Carrigan, 978-694-3299  
Southeast Region (Lakeville) - David Ellis, 508-946-2833  
Western Region (Springfield) - Dan Hall, 413-755-2212

## APPENDIX A: Detailed Site Plan, Layout, and Configuration



## APPENDIX B: Equipment Specifications

## APPENDIX C: MADEP Post-Closure Application

## APPENDIX D: MADEP Fast-Track Permitting Process

## APPENDIX E: MADEP Presentations And Fact Sheets

## APPENDIX F: Construction Schedule



## APPENDIX G: WMECO Interconnection Application

## APPENDIX H: WMECO Net Metering Rules

## APPENDIX I: WMECO Tariff

## APPENDIX J: Detailed Production Schedule

## APPENDIX K: Bosch Solar Energy AG Qualifications



## APPENDIX L: Tighe & Bond Qualifications

## APPENDIX M: TRC Solutions Qualifications

## APPENDIX N: Smart Energy Capital, LLC Qualifications

## APPENDIX O: Smart Energy Capital Letter of Interest

## APPENDIX P: MA Renewable Energy Portfolio Standard

## APPENDIX Q: MADEP Greenfield Landfill Approval



## **APPENDIX R: Signed Disclosure of Beneficial Interests, Non-Collusion, and Tax Compliance Certificate**

## APPENDIX S: Signed Addendum Acknowledgements

B L U E W A V E  
CAPITAL

B L U E W A V E  
CAPITAL

ID	Task Name	Start	Finish	Successors	Predecessors	January Jan	February Feb	March Mar	April Apr	May May	June Jun	July Jul	August Aug	September Sep	October Oct
1	Comprehensive Generic Schdule : 4.7 MW DC PV   Ground Mount	Tue 2/1/11	Tue 9/20/11												
2	Phase I - Preliminary Project Cost / Design	Tue 2/1/11	Wed 3/30/11												
3	Concept / Budget Development	Tue 2/1/11	Mon 2/14/11												
9	Design / Engineering	Tue 2/8/11	Wed 3/30/11												
14	RFPs Issued	Mon 3/21/11	Mon 3/28/11												
17	Phase II - Final Project Cost / Design	Mon 2/14/11	Thu 7/14/11												
18	Project Approval	Mon 3/21/11	Thu 3/24/11	26											
25	Permits & Applications	Thu 3/24/11	Tue 5/3/11												
30	Bosch SE Procurement	Mon 2/14/11	Thu 7/14/11												
53	Phase III - Construction	Mon 2/14/11	Tue 9/20/11												
54	Logistics	Mon 2/14/11	Thu 5/5/11												
67	Construction START	Thu 5/12/11	Mon 8/15/11												
79	Utility Scheduled Shut Down + Termination	Mon 8/15/11	Tue 8/16/11												
81	Bosch Inspection & Acceptance	Tue 8/16/11	Tue 8/30/11												
87	Commissioning	Tue 8/30/11	Thu 9/8/11												
93	Construction END -Project Closeout	Fri 9/9/11	Tue 9/20/11												

## APPENDIX G: WMECO Interconnection Application

DISTRIBUTED GENERATION INTERCONNECTION  
STANDARDS AND PROCEDURES TARIFF**Exhibit B – Expedited/Standard Process Interconnection Application****Instructions** *(please do not submit this page)***General Information**

If you wish to submit an application to interconnect your generating facility using the Expedited or Standard Process, please fill out all pages of the attached application form (not including this page of instructions). Once complete, please sign, attach the supporting documentation requested and enclose an application fee of \$3/kW (minimum of \$300 and maximum of \$2,500).

Contact Information: You must provide as a minimum the contact information of the legal applicant. If another party is responsible for interfacing with the Company (utility), you may optionally provide their contact information as well.

Ownership Information: Please enter the legal names of the owner or owners of the generating facility. Include the percentage ownership (if any) by any electric service company (utility) or public utility holding company, or by any entity owned by either.

Confidentiality Statement: In an ongoing effort to improve the interconnection process for Interconnecting Customer-owned generating facilities, the information you provide and the results of the application process will be aggregated with the information of other applicants and periodically reviewed by a DG Collaborative of industry participants that has been organized by the Massachusetts Department of Telecommunications and Energy (DTE). The aggregation process mixes the data together so that specific details for one Interconnecting Customer are not revealed. In addition to this process, you may choose to allow the information specific to your application to be shared with the Collaborative by answering “Yes” to the Confidentiality Statement question on the first page. Please note that even in this case your identification information (contact data) and specific generating facility location will not be shared.

**Generating Facility Information**

Account and Meter Numbers: Please consult an actual electric bill from the Electric Service Company and enter the correct Account Number and Meter Number on this application. If the facility is to be installed in a new location, a temporary number may be assigned by the Electric Company.

UL 1741 Listed? The standard UL 1741, “Inverters, Converters, and Controllers for Use in Independent Power Systems,” addresses the electrical interconnection design of various forms of generating equipment. Many manufacturers choose to submit their equipment to a Nationally Recognized Testing Laboratory (NRTL) that verifies compliance with UL 1741. This “listing” is then marked on the equipment and supporting documentation.

DEP Air Quality Permit Needed? A generating facility may be considered a point source of emissions of concern by the Massachusetts Department of Environmental Protection (DEP). Therefore, when submitting this application please indicate whether your generating facility will require an Air Quality Permit. You must answer these questions, however, your specific answers will not affect whether your application is deemed complete. Please contact the DEP to determine whether the generating technology planned for your facility qualifies for a DEP waiver or requires a permit.

Mail all material to: Western Massachusetts Electric Co., Attn: WMECO DG, 55 Russell St., Hadley, MA 01035



DISTRIBUTED GENERATION INTERCONNECTION  
STANDARDS AND PROCEDURES TARIFF

**Generating Facility Expedited/Standard Process Interconnection Application**

**Contact Information**

Date Prepared: \_\_\_\_\_

**Legal Name and address of Interconnecting Customer (or, Company name, if appropriate)**

Customer or Company Name: \_\_\_\_\_ Contact Person, if Company: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Telephone (Daytime): \_\_\_\_\_ (Evening): \_\_\_\_\_

Facsimile Number: \_\_\_\_\_ E-Mail Address: \_\_\_\_\_

**Alternative Contact Information (e.g. system installation contractor or coordinating company)**

Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Telephone (Daytime): \_\_\_\_\_ (Evening): \_\_\_\_\_

Facsimile Number: \_\_\_\_\_ E-Mail Address: \_\_\_\_\_

**Ownership** (include % ownership by any electric utility): \_\_\_\_\_

**Confidentiality Statement:** "I agree to allow information regarding the processing of my application (without my name and address) to be reviewed by the Massachusetts DG Collaborative that is exploring ways to further expedite future interconnections." Yes \_\_\_\_\_ No \_\_\_\_\_

**Generating Facility Information**

Address of Facility: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Electric Service Company: \_\_\_\_\_ Account Number: \_\_\_\_\_ Meter Number: \_\_\_\_\_

Type of Generating Unit: Synchronous \_\_\_\_\_ Induction \_\_\_\_\_ Inverter \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

Nameplate Rating: \_\_\_\_\_ (kW) \_\_\_\_\_ (kVAr) \_\_\_\_\_ (Volts) Single \_\_\_\_\_ or Three \_\_\_\_\_ Phase

Prime Mover: Fuel Cell\_ Recip Engine \_\_\_\_\_ Gas Turb \_\_\_\_\_ Steam Turb \_\_\_\_\_ Microturbine \_\_\_\_\_ PV \_\_\_\_\_ Other \_\_\_\_\_

Energy Source: Solar\_ Wind \_\_\_\_\_ Hydro \_\_\_\_\_ Diesel \_\_\_\_\_ Natural Gas \_\_\_\_\_ Fuel Oil \_\_\_\_\_ Other \_\_\_\_\_  
(Specify)

For Solar PV provide system total DC-STC rating: \_\_\_\_\_ (KW)

IEEE 1547.1 (UL 1741) Listed? Yes \_\_\_\_\_ No \_\_\_\_\_ Need an air quality permit from DEP? Yes\_ No \_\_\_\_\_ Not Sure \_\_\_\_\_

If "yes", have you applied for it? Yes \_\_\_\_\_ No \_\_\_\_\_

Planning to Export Power? Yes \_\_\_\_\_ No \_\_\_\_\_

A Cogeneration Facility? Yes \_\_\_\_\_ No \_\_\_\_\_

Anticipated Export Power Purchaser: \_\_\_\_\_

Export Form? Simultaneous Purchase/Sale \_\_\_\_\_ Net Purchase/Sale \_\_\_\_\_ Net Metering \_\_\_\_\_ Other \_\_\_\_\_  
(Specify)

Est. Install Date: \_\_\_\_\_ Est. In-Service Date: \_\_\_\_\_ Agreement Needed By: \_\_\_\_\_

**Application Process**

I hereby certify that, to the best of my knowledge, all of the information provided in this application is true:

Interconnecting Customer Signature: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

The information provided in this application is complete:

Company Signature: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

# DISTRIBUTED GENERATION INTERCONNECTION STANDARDS AND PROCEDURES TARIFF

**Generating Facility Technical Detail**

Date: \_\_\_\_\_

Information on components of the generating facility that are currently Listed:

Equipment Type	Manufacturer	Model	National Standard
1.	—	—	—
2.	—	—	—
3.	—	—	—
4.	—	—	—
5.	—	—	—
6.	—	—	—

Total Number of Generating Units in Facility? \_\_\_\_\_

Generator Unit Power Factor Rating: \_\_\_\_\_

Max Adjustable Leading Power Factor? \_\_\_\_\_ Max Adjustable Lagging Power Factor? \_\_\_\_\_

Generator Characteristic Data (for all inverter-based machines)

Max Design Fault Contribution Current? \_\_\_\_\_ Instantaneous \_\_\_\_\_ or RMS? \_\_\_\_\_

Harmonics Characteristics: \_\_\_\_\_

Start-up power requirements: \_\_\_\_\_

Generator Characteristic Data (for all rotating machines)

Rotating Frequency: \_\_\_\_\_ (rpm) Neutral Grounding Resistor (If Applicable): \_\_\_\_\_

Additional Information for Synchronous Generating UnitsSynchronous Reactance,  $X_d$ : \_\_\_\_\_ (PU) Transient Reactance,  $X'_d$ : \_\_\_\_\_ (PU)Subtransient Reactance,  $X''_d$ : \_\_\_\_\_ (PU) Neg Sequence Reactance,  $X_2$ : \_\_\_\_\_ (PU)Zero Sequence Reactance,  $X_0$ : \_\_\_\_\_ (PU) kVA Base: \_\_\_\_\_

Field Voltage: \_\_\_\_\_ (Volts) Field Current: \_\_\_\_\_ (Amps)

Additional information for Induction Generating UnitsRotor Resistance,  $R_r$ : \_\_\_\_\_ Stator Resistance,  $R_s$ : \_\_\_\_\_Rotor Reactance,  $X_r$ : \_\_\_\_\_ Stator Reactance,  $X_s$ : \_\_\_\_\_Magnetizing Reactance,  $X_m$ : \_\_\_\_\_ Short Circuit Reactance,  $X_d''$ : \_\_\_\_\_

Exciting Current: \_\_\_\_\_ Temperature Rise: \_\_\_\_\_

Frame Size: \_\_\_\_\_

Total Rotating Inertia,  $H$ : \_\_\_\_\_ Per Unit on kVA Base: \_\_\_\_\_

Reactive Power Required In Vars (No Load): \_\_\_\_\_

Reactive Power Required In Vars (Full Load): \_\_\_\_\_

Additional information for Induction Generating Units that are started by motoring

Motoring Power: \_\_\_\_\_ (kW) Design Letter: \_\_\_\_\_

# DISTRIBUTED GENERATION INTERCONNECTION STANDARDS AND PROCEDURES TARIFF

**Interconnection Equipment Technical Detail**

Date: \_\_\_\_\_

Will a transformer be used between the generator and the point of interconnection? Yes \_\_\_\_\_ No \_\_\_\_\_

Will the transformer be provided by Interconnecting Customer? Yes \_\_\_\_\_ No \_\_\_\_\_

**Transformer Data (if applicable, for Interconnecting Customer-Owned Transformer):**

Nameplate Rating: \_\_\_\_\_ (kVA) Single \_\_\_\_\_ or Three \_\_\_\_\_ Phase

Transformer Impedance: \_\_\_\_\_ (%) on a \_\_\_\_\_ kVA Base

If Three Phase:

Transformer Primary: \_\_\_\_\_ (Volts) \_\_\_\_\_ Delta \_\_\_\_\_ Wye \_\_\_\_\_ Wye Grounded \_\_\_\_\_ Other

Transformer Secondary: \_\_\_\_\_ (Volts) \_\_\_\_\_ Delta \_\_\_\_\_ Wye \_\_\_\_\_ Wye Grounded \_\_\_\_\_ Other

**Transformer Fuse Data (if applicable, for Interconnecting Customer-Owned Fuse):**

(Attach copy of fuse manufacturer's Minimum Melt &amp; Total Clearing Time-Current Curves)

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Size: \_\_\_\_\_

Speed: \_\_\_\_\_

**Interconnecting Circuit Breaker (if applicable):**Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Load Rating: \_\_\_\_\_ Interrupting Rating: \_\_\_\_\_ Trip Speed: \_\_\_\_\_  
(Amps) (Amps) (Cycles)**Interconnection Protective Relays (if applicable):**

(If microprocessor-controlled)

List of Functions and Adjustable Setpoints for the protective equipment or software:

Setpoint Function	Minimum	Maximum
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____

(If discrete components)

(Enclose copy of any proposed Time-Overcurrent Coordination Curves)

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Style/Catalog No.: \_\_\_\_\_ Proposed Setting: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Style/Catalog No.: \_\_\_\_\_ Proposed Setting: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Style/Catalog No.: \_\_\_\_\_ Proposed Setting: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Style/Catalog No.: \_\_\_\_\_ Proposed Setting: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Style/Catalog No.: \_\_\_\_\_ Proposed Setting: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Style/Catalog No.: \_\_\_\_\_ Proposed Setting: \_\_\_\_\_

**Current Transformer Data (if applicable):**

(Enclose copy of Manufacturer's Excitation &amp; Ratio Correction Curves)

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Accuracy Class: \_\_\_\_\_ Proposed Ratio Connection: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Accuracy Class: \_\_\_\_\_ Proposed Ratio Connection: \_\_\_\_\_

**Potential Transformer Data (if applicable):**

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Accuracy Class: \_\_\_\_\_ Proposed Ratio Connection: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Type: \_\_\_\_\_ Accuracy Class: \_\_\_\_\_ Proposed Ratio Connection: \_\_\_\_\_

DISTRIBUTED GENERATION INTERCONNECTION  
STANDARDS AND PROCEDURES TARIFF

**General Technical Detail**

Date: \_\_\_\_\_

Enclose 3 copies of site electrical One-Line Diagram showing the configuration of all generating facility equipment, current and potential circuits, and protection and control schemes with a Massachusetts registered professional engineer (PE) stamp.

Enclose 3 copies of any applicable site documentation that indicates the precise physical location of the proposed generating facility (e.g., USGS topographic map or other diagram or documentation).

Proposed Location of Protective Interface Equipment on Property:  
(Include Address if Different from Application Address)

\_\_\_\_\_  
\_\_\_\_\_

Enclose copy of any applicable site documentation that describes and details the operation of the protection and control schemes.

Enclose copies of applicable schematic drawings for all protection and control circuits, relay current circuits, relay potential circuits, and alarm/monitoring circuits (if applicable).

Please enclose any other information pertinent to this installation.

## Schedule Z

### Additional Information Required for Net Metering Service

**Please fill out the form completely.**

Host Customer Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Address of Facility: \_\_\_\_\_

Electric Account Number: \_\_\_\_\_

Meter Number: \_\_\_\_\_ Application ID Number: \_\_\_\_\_

A) Is the Host Customer applying for net metering service an electric company, generation company, aggregator, supplier, energy marketer, or energy broker, as those terms are used in M.G.L. c. 164, §§ 1 and 1F and 220 C.M.R. 11.00?

\_\_\_\_\_ No

\_\_\_\_\_ Yes (you are not eligible for net metering service)

NOTE: Definitions are:

“Electric company” means a corporation organized under the laws of the commonwealth for the purpose of making by means of water power, steam power or otherwise and for selling, transmitting, distributing, transmitting and selling, or distributing and selling, electricity within the commonwealth, or authorized by special act so to do, even though subsequently authorized to make or sell gas; provided, however, that electric company shall not mean an alternative energy producer; provided further, that a distribution company shall not include an entity which owns or operates a plant or equipment used to produce electricity, steam and chilled water, or an affiliate engaged solely in the provision of such electricity, steam and chilled water, where the electricity produced by such entity or its affiliate is primarily for the benefit of hospitals and nonprofit educational institutions, and where such plant or equipment was in operation before January 1, 1986; and provided further, that electric company shall not mean a corporation only transmitting and selling, or only transmitting, electricity unless such corporation is affiliated with an electric company organized under the laws of the commonwealth for the purpose of distributing and selling, or distributing only, electricity within the commonwealth. G.L. c. 164, § 1.

“Generation company” means a company engaged in the business of producing, manufacturing or generating electricity or related services or products, including but not limited to, renewable energy generation attributes for retail sale to the public. G.L. c. 164, § 1.

“Aggregator” means an entity which groups together electricity customers for retail sale purposes, except for public entities, quasi-public entities or authorities, or subsidiary organizations thereof, established under the laws of the commonwealth. G.L. c. 164, § 1.

“Supplier” means any supplier of generation service to retail customers, including power marketers, brokers and marketing affiliates of distribution companies, except that no electric company shall be considered a supplier. G.L. c. 164, § 1.

For the terms “energy marketer” and “energy broker,” please use the definition for “Electricity Broker,” which means an entity, including but not limited to an Aggregator, that facilitates or otherwise arranges for the purchase and sale of electricity and related services to Retail Customers,

but does not sell electricity. Public Aggregators shall not be considered Electricity Brokers. 220 C.M.R. 11.02.

B) If applying for Net Metering as an Agricultural Net Metering Facility, please answer the following questions:

- 1) Is the Agricultural Net Metering Facility operated as part of an agricultural business?  
☐ Yes  
☐ No (the facility is not eligible for Net Metering as an Agricultural Net Metering Facility)
- 2) Has the Commissioner of the Department of Agriculture recognized the business as an agricultural business?  
☐ Yes  
☐ No
- 3) Is the Agricultural Net Metering Facility located on land owned or controlled by the agricultural business mentioned in Item B.1 above?  
☐ Yes  
☐ No (the facility is not eligible for Net Metering as an Agricultural Net Metering Facility)
- 4) Is the energy from the Agricultural Net Metering Facility used to provide electricity to metered accounts of the agricultural business mentioned in Item B.1 above?  
☐ Yes  
☐ No (the facility is not eligible for Net Metering as an Agricultural Net Metering Facility)

C) If applying for neighborhood net metering, please answer the following questions:

- 1) Are all participants served by the same distribution company?  
☐ Yes  
☐ No
- 2) Are all participants served by the same ISO-NE load zone?  
☐ Yes  
☐ No
- 3) Do all participants reside in the same municipality?  
☐ Yes  
☐ No

NOTE: If any of the answers to the questions in Item C are no, then the facility is ineligible for neighborhood net metering unless granted an exception by the Department of Public Utilities under 220 C.M.R. 18.09(6).

D) Please indicate how the Host Customer will report to the Company the amount of electricity generated by the net metering facility. The information is due twice each year: (1) by January 31 for the prior year's generation; (2) by September 30 for the year-to-date generation:

- ☐ Provide the Company access to their ISO-NE GIS account
- ☐ Provide the Company access to their metering or inverter data
- ☐ Provide the Company with a report in writing of the generation by January 31 and again on September 30 each year

E) For any Billing Period in which the Host Customer earns Net Metering Credits, please indicate how the Distribution Company will apply them:



\_\_\_\_\_ Apply all of the Net Metering Credits to the account of the Host Customer (Skip Items F and G)

\_\_\_\_\_ Allocate all the Net Metering Credits to the accounts of eligible Customers (Class I and II Net Metering Facilities skip Item F)

\_\_\_\_\_ Both apply a portion of the Net Metering Credits to the Host Customer's account and allocate a portion to the accounts of eligible Customers (Class I and II Net Metering Facilities skip Item F)

F) If the Host Customer has a Class III Net Metering Facility, please indicate below the range that best represents the number of eligible Customer accounts to which Net Metering Credits would be allocated. Alternatively, please complete Item G. This information will allow the Company to exercise its option to purchase Net Metering Credits from the Host Customer rather than allocating such credits.

The Company will notify the Host Customer within 30 days of the filing of Schedule Z whether it will allocate or purchase Net Metering Credits. If the Company elects to purchase Net Metering Credits, the Company will render payment by issuing a check to the Host Customer each Billing Period, unless otherwise agreed in writing by the Host Customer and Company. If the Company elects to allocate Net Metering Credits, the Host Customer must complete Item G and submit the revised Schedule Z to the Company.

\_\_\_\_\_ Allocate Net Metering Credits to fewer than 50 eligible Customer accounts (Skip Item G)

\_\_\_\_\_ Allocate Net Metering Credits to 100 or fewer eligible Customer accounts (Skip Item G)

\_\_\_\_\_ Allocate Net Metering Credits to more than 100 eligible Customer accounts (Skip Item G)

G) Please state the total percentage of Net Metering Credits to be allocated.

\_\_\_\_\_ % Amount of the Net Metering Credit being allocated. The total amount of Net Metering Credits being allocated shall not exceed 100 %. Any remaining percentage will be applied to the Host Customer's account.

Please identify each eligible Customer account to which the Host Customer is allocating Net Metering Credits by providing the following information (attach additional pages as needed):

NOTE: If a designated Customer account closes, the allocated percentage will revert to the Host Customer's account, unless otherwise mutually agreed in writing by the Host Customer and the Company.

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

Name:  
Billing Address:  
Account number:  
Amount of the Net Metering Credit: \_\_\_\_%

H) The Company may elect to seek to obtain capacity payments from ISO-NE for the electricity generated by Class II and III Net Metering Facilities. The Company will notify the Host Customer within 30 days of the filing of Schedule Z whether it will assert title to the right to seek those

capacity payments. If the Company elects to assert title to those capacity payments, the Company will include any capacity payments received from ISO-NE in the Company's annual Net Metering Recovery Surcharge reconciliation.

I) The terms of this Schedule Z shall remain in effect unless and until the Host Customer executes a revised Schedule Z and submits it to the Company. Unless otherwise required herein or mutually agreed to in writing by the Host Customer and the Company, a revised Schedule Z shall not be submitted more than twice in any given calendar year.

J) A signature on the application shall constitute certification that (1) the Host Customer has read the application and knows its contents; (2) the contents are true as stated, to the best knowledge and belief of the Host Customer; and (3) the Host Customer possesses full power and authority to sign the application.

---

Host Customer

---

Date

**Please return Schedule Z to:**

Western Massachusetts Electric Company  
Attention: WMECO DG  
55 Russell Street  
Hadley, MA 01035-9455

Fax: 413-585-1709

## APPENDIX H: WMECO Net Metering Rules

## Net Metering Frequently Asked Questions

Q. I'm already getting compensated for excess generation – what changed with the new net metering rules?

A. The Net Metering tariff expanded the size limit of generation that qualifies for net metering from 60 kilowatts (kW) to 2 megawatts (MW). Additionally, the compensation amount for customers with renewable generation like solar, wind or agricultural, increased (see Net Metering Web page for specifics).

Q. How will I be compensated for excess generation under the new net metering tariff?

A. A credit will be applied to your monthly bill (see Net Metering Web page for compensation specifics). These credits will carry forward from billing period to billing period.

Q. Does everyone get compensated at the same rate for excess generation?

A. No. Depending on your customer rate class (i.e. residential customer, small, medium or large business, etc.) the compensation will vary. Also, because the supply portion of your bill changes several times per year (twice for residential and small business customers and four times per year for medium and large business customers), the compensation you receive for supply rate for excess generation will fluctuate.

Q. Can I share or allocate my net metering credits with other customers?

A. Yes. Customers who are net metered can share a percentage of their credits with other WMECO customers. On the Schedule Z application, please fill out section G. Page 4 provides you with space to indicate the customer(s) information you would like to allocate credits to. It's important to note that the percentage you allocate to other WMECO customers stays the same every month, even if your excess generation varies month to month.

Q. Is it a requirement that I submit the Net Metering Application, a.k.a. Schedule Z?

A. If you are an existing customer and would like to receive increased compensation as provided by the new Net Metering tariff, then you'll need to submit the Schedule Z application. If you do not submit the application, you will continue to receive compensation at the average loss-adjusted monthly clearing price set by ISO New England. Customers that are newly applying for Distributed Generation and net metering must submit the Schedule Z application.

Q. How do I fill out the Net Metering/Schedule Z application?

A. The Schedule Z application is 5 pages long. Customers need only fill out the sections that apply to them. Most customers (excluding Agricultural net metering and Neighborhood net metering customers) will fill out sections A, D, E and J.

Q. What are the generation reporting requirements of a Class I Host Customer as listed in Section D of Schedule Z?

A. Class I customers will be required to submit a written report twice a year to WMECO of the amount of electricity generated. This information can be found on your production meter or inverter. WMECO is in the process of working out implementation details. The first report will be

due to WMECO by September 30, 2010. Future reports by Class I net metered customers will be due by January 31 and September 30.

Q. What are the generation reporting requirements of Class II and Class III Host Customers as listed in Section D of Schedule Z?

A. Class II and Class III customers will be required to install an ION 7330 revenue grade meter with Ethernet or phone line connection to record the amount of electricity generated by their solar, wind or agricultural facility. WMECO is communicating with existing customers about this requirement. Customers applying for generation interconnection and net metering will be supplied with the details as part of the application process.

Q. How often can I submit a Schedule Z application?

A. The Schedule Z application can be submitted no more than twice per year.

Q. I've been asked to provide my Application I.D. What is it and how can I find it?

A. For customers with existing generation, your Application I.D. is a unique number assigned to the application you submitted before installing your Distributed Generation (DG) system. It can be found on the copy of the application that we mailed back to you after you submitted your DG application. If you don't have that number handy, you may leave it blank, as long as you provide other information on the application that helps us identify you, such as your name, phone number, address and WMECO account number. The same applies to customers who are newly applying for generation.

Q. I've been asked to provide my WMECO account number and my meter number. Where can I find them?

A. Both your account number and meter number can be found on your monthly bill. The account number is located at the top right corner, and the meter number is located just below your address and above your billing period information on the bill.

Q. Will WMECO seek capacity payments for Class II and Class III net metering facilities?

A. At this time, WMECO is not planning to seek capacity payments from ISO-NE for electricity generated by Class II or Class III generation facilities.

Q. Who do I contact to learn more about Net Metering?

A. If you still have questions after reading this document and the Net Metering Web page, you may submit an e-mail to [wmecodg@nu.com](mailto:wmecodg@nu.com) or call the DG and net metering information line at (413) 787-1087.

# Net Metering Credits

Metered sales (kWh delivered to utility) and purchases (kWh delivered to customer) are “netted” over the billing month

- Utility charges\* apply for net monthly purchases (i.e., if metered purchases > metered sales)
- A net metering credit is provided for net monthly excess kWh (i.e., if metered sales > metered purchases)

**Net Metering Credit = Excess kWh x applicable tariff rates**

				Component of Service			
Class	Min	Max	Type	Default Service	Distribution	Transmission	Transition
1	0	60 kW	Agriculture, Wind, Solar	X	X	X	X
1	0	60 KW	All others	Average, loss-adjusted ISO-NE monthly clearing price			
2	> 60 KW	1,000 kW	Agriculture, Wind, Solar	X	X	X	X
3	>1,000 kW	2,000 kW	Agriculture, Wind, Solar	X	Municipal & Government only	X	X

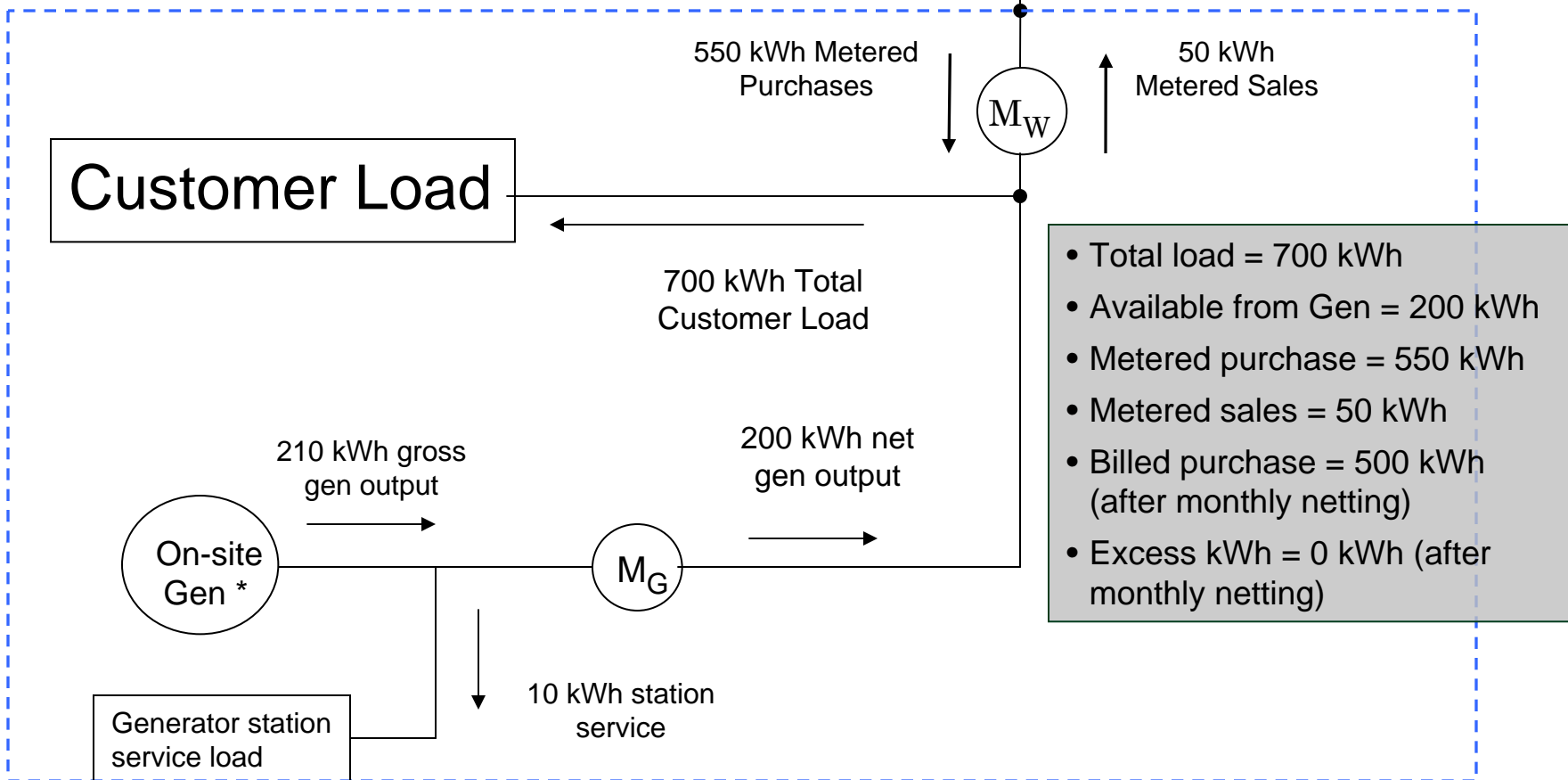
\* Customer service charges and demand charges not impacted by monthly netting. Per kWh charges apply to metered purchases (i.e., without netting) for components of service not listed in table above.



# Net Metering Example 1: Monthly Purchases > Sales

Western Massachusetts Electric Company Distribution System

Customer Service Location

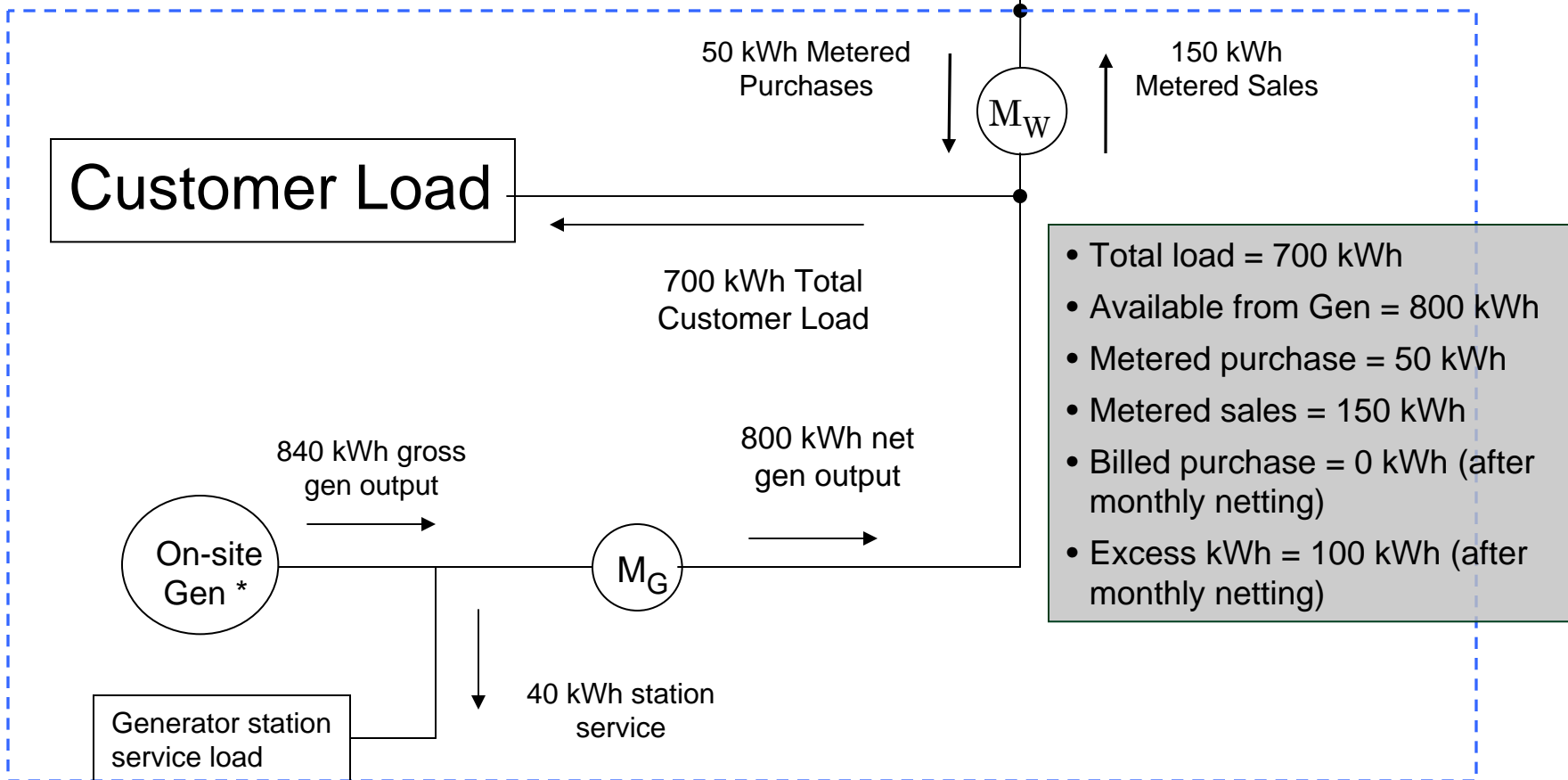


\* 2 kW Solar (PV) Generator

## Net Metering Example 2: Monthly Sales > Purchases

Western Massachusetts Electric Company Distribution System

Customer Service Location



\* 8 kW Solar (PV) Generator

## APPENDIX I: WMECO Tariff

## NET METERING

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Applicability

The following tariff provisions shall be applicable to a Host Customer, as defined herein, that requests net metering services from the Distribution Company, with the exception of a Host Customer that is an electric company, generation company, aggregator, supplier, energy marketer, or energy broker, as those terms are used in M.G.L. c. 164, §§ 1 and 1F and 220 C.M.R. 11.00. Service under this rate to any Host Customer is subject to the Distribution Company's printed requirements and the Distribution Company's Terms and Conditions – Distribution Service, each as in effect from time to time. The interconnection date of a facility shall have no bearing on a Host Customer's eligibility to request net metering services under the following tariff.

Section 1.01 Definitions

The terms set forth below shall be defined as follows, unless the context otherwise requires.

Agricultural Net Metering Facility means a Renewable Energy generating facility that is operated as part of an agricultural business, generates electricity, does not have a generation capacity of more than two megawatts, is located on land owned or controlled by the agricultural business, and is used to provide energy to metered accounts of the business. "Agriculture" has the same meaning as provided in M.G.L. c. 128, § 1A; provided that, when necessary, the Commissioner of the Department of Agricultural Resources shall determine if a business is an agricultural business and whether the facility is operated as part of that business.

Billing Period means the period of time set forth in the Distribution Company's terms and conditions for which the Distribution Company bills a Customer for its electricity consumed or estimated to have been consumed.

Class I Net Metering Facility means a plant or equipment that is used to produce, manufacture, or otherwise generate electricity and that is not a transmission facility and that has a design capacity of 60 kilowatts or less.

Class II Net Metering Facility means an Agricultural Net Metering Facility, Solar Net Metering Facility, or Wind Net Metering Facility with a generating capacity of more than 60 kilowatts but less than or equal to one megawatt; provided, however, that a Class II Net Metering Facility owned or operated by a Customer which is a municipality or other governmental entity may have a generating capacity of more than 60 kilowatts but less than or equal to one megawatt per unit.

Class III Net Metering Facility means an Agricultural Net Metering Facility, Solar Net Metering Facility, or Wind Net Metering Facility with a generating capacity of more than one megawatt but less than or equal to two megawatts; provided, however, that a Class III Net Metering Facility

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owned or operated by a Customer which is a municipality or other governmental entity may have a generating capacity of more than one megawatt but less than or equal to two megawatts per unit.

Customer means any person, partnership, corporation, or any other entity, whether public or private, who obtains distribution service at a customer delivery point and who is a customer of record of the Distribution Company for its own electricity consumption.

Distribution Company means Western Massachusetts Electric Company.

Host Customer means a Customer with a Class I, II, or III Net Metering Facility or Neighborhood Net Metering Facility that generates electricity on the Customer's side of the meter.

Interconnection Tariff means the Distribution Company's Standards for Interconnecting Distributed Generation, M.D.P.U. No. 1039E.

ISO-NE means ISO New England Inc., the independent system operator for New England, or its successor, authorized by the Federal Energy Regulatory Commission to operate the New England bulk power system and administer New England's organized wholesale electricity market pursuant to the ISO-NE Tariff and operation agreements with transmission owners.

Neighborhood means a geographic area within a municipality, subject to the right of the Department to grant exceptions pursuant to 220 CMR 18.09(6), that:

- (a) is recognized by the residents as including a unique community of interests;
- (b) falls within the service territory of the Distribution Company and within a single ISO-NE load zone; and
- (c) may encompass residential, commercial, and undeveloped properties.

Neighborhood Net Metering Facility means a Class I, II, or III Net Metering Facility that:

- (a) is owned by, or serves the energy needs of, a group of ten or more residential Customers that reside in a single Neighborhood and are served by a single Distribution Company;
- (b) may also be owned by, or serve the energy needs of, other Customers who reside in the same Neighborhood and are served by the same Distribution Company as the residential Customers that own or are served by the facility; and
- (c) is located within the same Neighborhood as the Customers that own or are served by the facility.

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Net Metering means the process of measuring the difference between electricity delivered by a Distribution Company and electricity generated by a Class I, Class II, Class III or Neighborhood Net Metering Facility and fed back to the Distribution Company.

Net Metering Credit means the monetary value of the excess electricity generated by a net metering facility, calculated pursuant to Section 1.06, below.

Renewable Energy means energy generated from any source that qualifies as a Class I or Class II Renewable Energy generating source under M.G.L. c. 25A, § 11F; provided, however, that after conducting administrative proceedings, the Department of Energy Resources, in consultation with the Department of Agricultural Resources, may add technologies or technology categories.

Solar Net Metering Facility means a facility for the production of electrical energy that uses sunlight to generate electricity and is interconnected to the Distribution Company.

Wind Net Metering Facility means a facility for the production of electrical energy that uses wind to generate electricity and is interconnected to the Distribution Company.

Section 1.02 Interconnection

Interconnection of net metering facilities is governed by the terms of the Distribution Company's Interconnection Tariff, which sets forth the following information for net metering services:

- (a) Application procedures;
- (b) Information necessary for requests;
- (c) Metering and technical requirements; and
- (d) Termination and suspension provisions.

The Customer shall indicate its request for net metering on its application pursuant to the Interconnection Tariff.

Section 1.03 Metering and Reporting of Generation

1. Host Customers with a Class II or III Net Metering Facility shall install at the Host Customer's expense revenue-grade meters to measure the generator's kilowatt-hour ("kWh") output. Unless otherwise agreed in writing with the Distribution Company, the

## NET METERING

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Host Customer will provide the actual metered output to the Distribution Company twice per calendar year: on or before January 31 and on or before September 30.

2. Unless otherwise agreed in writing with the Distribution Company, a Host Customer with a Class I Net Metering Facility, who does not have a generation information system ("GIS") account at ISO-NE, will provide, if available, the inverter's generation information to the Distribution Company twice per calendar year: on or before January 31 and on or before September 30.
3. Unless otherwise agreed in writing with the Distribution Company, a Host Customer with a Class I Net Metering Facility, who does not have a GIS account at ISO-NE and does not otherwise have generation information available, shall provide all necessary information to, and cooperate with, the Distribution Company to enable the Distribution Company to estimate the annual generation.

Section 1.04 Qualifications for Neighborhood Net Metering Facilities

The Host Customer of a Neighborhood Net Metering Facility shall fulfill the requirements of the Distribution Company's Interconnection Tariff, as noted in Section 1.02, above, and shall further provide and maintain on file with the Distribution Company written documentation demonstrating that all parties eligible to receive Net Metering Credits from the Neighborhood Net Metering Facility meet the terms of the definition of a Neighborhood Net Metering Facility, as provided herein and in the Department's regulations at 220 C.M.R. 18.02.

Section 1.05 Administration of Net Metering Credits

1. The Distribution Company shall calculate a Net Metering Credit as set forth in Section 1.06 below, and not bill a Host Customer for kWh usage, for any Billing Period in which the kWh generated by a Class I, II, or III Net Metering Facility or a Neighborhood Net Metering Facility exceed the kWh usage of the Host Customer.
2. Each Distribution Company shall bill a Host Customer for excess consumption for any Billing Period in which the kWh consumed by a Host Customer exceed the kWh generated by a Class I, II or III Net Metering Facility or Neighborhood Net Metering Facility.

Section 1.06 Calculation of Net Metering Credits

1. For a Class I Wind Net Metering Facility, Class I Solar Net Metering Facility, Class I Agricultural Net Metering Facility, Class II Net Metering Facility, and Class III Net Metering Facility where the Host Customer is a municipality or other governmental entity, the Distribution Company shall calculate for each Billing Period a Net Metering Credit equal to the product of the:



NET METERING

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- (a) excess kWh, by time-of-use if applicable; and
  - (b) sum of the following Distribution Company charges applicable to the rate class under which the Host Customer takes service:
    - (i) the default service kWh charge (in the ISO-NE load zone where the Host Customer is located);
    - (ii) the distribution kWh charge;
    - (iii) the transmission kWh charge; and
    - (iv) the transition kWh charge.
- 2. For a Class I Net Metering Facility other than a Class I Wind Net Metering Facility, Class I Agricultural Net Metering Facility, or a Class I Solar Net Metering Facility, the Distribution Company shall calculate a Net Metering Credit for each Billing Period as the product of the:
  - (a) excess kWh, by time-of-use if applicable; and
  - (b) average monthly clearing price at the ISO-NE.
- 3. For a Neighborhood Net Metering Facility or a Class III Net Metering Facility where the Host Customer is not a municipality or governmental entity, the Distribution Company shall calculate a Net Metering Credit for each Billing Period as the product of the:
  - (a) excess kWh, by time-of-use if applicable; and
  - (b) sum of the following Distribution Company charges applicable to the rate class under which the Host Customer takes service:
    - (i) the default service kWh charge (in the ISO-NE load zone where the Host Customer is located);
    - (ii) the transmission kWh charge; and
    - (iii) the transition kWh charge.

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4. The calculation of Net Metering Credits under this section shall not include the demand side management and renewable energy kWh charges set forth in M.G.L. c. 25, §§ 19-20.
5. For any Billing Period for which the Distribution Company calculates a Net Metering Credit for a Host Customer, the Distribution Company shall apply the Net Metering Credit to the Host Customer's account, unless the Host Customer provides otherwise pursuant to Section 1.07. The Distribution Company shall carry forward, from Billing Period to Billing Period, any remaining Net Metering Credit balance.

Section 1.07 Allocation of Net Metering Credits

1. For a Class I or II Wind Net Metering Facility, Solar Net Metering Facility, or Agricultural Net Metering Facility; Class III Net Metering Facility; or Neighborhood Net Metering Facility, the Distribution Company shall allocate Net Metering Credits, as designated in writing by the Host Customer, to other Customers who are in the Distribution Company's service territory and are located in the same ISO-NE load zone.
2. For a Neighborhood Net Metering Facility, the Distribution Company may only allocate Net Metering Credits to residential or other Customers who reside in the same Neighborhood in which the Neighborhood Net Metering Facility is located and have an ownership interest in, or are served by, the Neighborhood Net Metering Facility.
3. For any Billing Period that a Host Customer earns Net Metering Credits, the Distribution Company shall allocate Net Metering Credits by applying them to a designated Customer's account. The Distribution Company shall carry forward, from Billing Period to Billing Period, any remaining Net Metering Credit balance.
4. For a Class III Net Metering Facility, the Distribution Company may elect to purchase Net Metering Credits from the Host Customer, rather than allocating such Credits. The Distribution Company must provide written notice to the Host Customer of its election to either purchase or allocate Net Metering Credits within 30 days of the Host Customer's request for Net Metering Services. For Net Metering Credits purchased under this provision, the Distribution Company will make payment by issuing a check to the Host Customer each Billing Period, unless otherwise agreed in writing with the Host Customer. In addition, the Distribution Company shall continue to purchase such credits for so long as the Host Customer takes service under this tariff or as mutually agreed in writing by the Distribution Company and the Host Customer.
5. The Distribution Company is responsible for accurately allocating Net Metering Credits consistent with a Host Customer's written designation in Schedule Z to the Distribution Company's Interconnection Tariff.

## NET METERING

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Section 1.08 Net Metering Recovery Surcharge

The charges listed below are non-bypassable and shall be applied to all kWh delivered by the Distribution Company to a Customer. The operation of the Net Metering Recovery Surcharge (“NMRS”) is subject to all powers of suspension and investigation vested in the Department.

1) Rates

The purpose of the NMRS is to recover the Net Metering Credits applied to Customers and the non-reconciling distribution portion of revenue displaced by Customers who have installed on-site generation facilities in accordance with G.L. c. 164, §§ 138 and 139. This surcharge provides the Distribution Company with a mechanism to recover such Credits and displaced revenue, and to reconcile actual NMRS revenue amounts recovered from customers with actual recoverable amounts.

2) Applicability of NMRS

The NMRS shall be applicable to all firm distribution of electricity, as measured in kWh, delivered by the Distribution Company. Although the NMRS is a separate surcharge, it may be included in the Distribution Company’s Distribution Charge for billing purposes.

3) Effective Date of Annual Surcharge

The date on which the annual NMRS becomes effective shall be the first day of each calendar year, unless otherwise ordered by the Department. The Distribution Company shall submit NMRS filings as outlined in Section 1.08(6) of this tariff at least 30 days before the NMRS is proposed to take effect.

4) NMRS Formula

$$NMRS_x = (NMC_{x-1} + DDR_{x-1} + PPRA_{x-2}) / FkWh_x,$$

where

x = The year over which the surcharge applies;

NMRS<sub>x</sub> = The Net Metering Recovery Surcharge for year x;

NMC<sub>x-1</sub> = The Net Metering Credits for year x-1, based on actual data where available and estimated for the period where actual data is unavailable;

## NET METERING

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$DR_{x-1}$  = The non-reconciling distribution portion of revenue displaced, as defined in Section 1.08(5), by net metering facilities for year x-1, based on actual data where available and estimated for the period where actual data is unavailable;

$PRA_{x-2}$  = The Past Period Reconciliation Amount defined as the ending balance including interest, calculated on the average monthly reconciling balance using the customer deposit rate as outlined in 220 C.M.R. 26.09, of the difference between (a) the sum of the NMC and DDR based on actual data for year x-2 and (b) the revenues collected through the NMRS as approved by the Department for year x-1, based on actual data where available and estimated for the period where actual data is unavailable;

$FkWh_x$  = The Forecasted kWh for year x, defined as the forecasted amount of electricity to be distributed to the Distribution Company's distribution customers.

5) Determination of Revenue Displaced by Net Metering Facilities

- a) The revenue displaced by net metering facilities is the non-reconciling distribution revenue associated with the displaced kWh. The quantity of displaced kWh is equal to the kWh generated by the net metering facility minus the excess kWh, if any, delivered to the Distribution Company's distribution system. The kWh generated by the net metering facility shall be determined by:
  - i) actual metering of the kWh output of the generating facility; or
  - ii) estimating the kWh output of a generating facility when actual metering is not feasible.
- b) In determining DDR, the Distribution Company shall use actual metered data for those Host Customers with Class II and III Net Metering Facilities and for those Host Customers with a Class I Net Metering Facility when such data is available.
- c) In determining DDR, the Distribution Company shall estimate the generator kWh output for those Host Customers that do not have actual metered data for the output of their Class I Net Metering Facility. These estimates will be based upon available monthly capacity factor information associated with the size and type of net metering facility installed, or as otherwise specified below. Such information shall be obtained from publicly available sources such as ISO-NE, the Massachusetts Renewable Energy Trust and weather data outlets as determined by the Distribution Company and subject to Department review and approval.

## NET METERING

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- i) For Class I Solar Net Metering Facilities, the estimate shall come directly from the generation information of the Solar Net Metering Facility's inverter if available. If no data is available to the Distribution Company, the estimate shall be calculated on a case-by-case basis with the best available data.
- ii) For Class I Wind Net Metering Facilities:
  - (1) the estimate shall come directly from the generation information of the Wind Net Metering Facility's meter, inverter, or other generator system if available; or
  - (2) if generation information is not available, or no data is provided, the estimate shall be calculated on a case-by-case basis with the best available data.
- iii) For all non-wind and non-solar Class I Net Metering Facilities, the estimate shall be calculated on a case-by-case basis with the best available data.

6) Information Required to be Filed with the Department

Information pertaining to the annual NMRS shall be filed with the Department at least thirty (30) days before the date on which a new NMRS is requested to be effective. Such filing shall include preliminary reconciliation data for the year in which the filing is made, with final reconciliation amounts to be submitted the subsequent year. The reconciliation data will reflect detailed accounting of distribution Net Metering Credits paid to customers and displaced distribution revenue resulting from net metering facilities. This information will be submitted with each annual NMRS filing, along with complete documentation of the reconciliation-adjustment calculations.

7) Customer Notification

The Distribution Company will notify Customers in simple terms of changes to the NMRS, including the nature of the change and the manner in which the NMRS is applied to the bill. In the absence of a standard format, the Distribution Company will submit this notice for approval at the time of each NMRS filing. Upon approval by the Department, the Distribution Company must immediately distribute these notices to all of its Customers either through direct mail or with its bills.

## NET METERING

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8) Commodity Reconciliation

The Distribution Company will include the energy market payments received from ISO-NE for the electricity generated by Class II and III Net Metering Facilities in the Distribution Company's annual reconciliation of the NMRS. Host Customers with a Class II or III Net Metering Facility shall provide all necessary information to, and cooperate with, the Distribution Company to enable the Distribution Company to obtain the appropriate asset identification for reporting generation to ISO-NE. The Distribution Company will report all exported power to the ISO-NE as a settlement only generator and net this reported usage and credits earned against the amount of default service commodity earned as a portion of the Net Metering Credits. The resulting amount will then be filed within the Distribution Company's annual NMRS reconciliation proceeding.

The Distribution Company may elect to seek to obtain capacity payments from ISO-NE for the electricity generated by Class II and III Net Metering Facilities, in which case it will include any capacity payments received from ISO-NE in the Company's annual NMRS reconciliation.

Section 1.09 Closure of Tariff to New Customers

Service under this tariff is closed to new applicants upon determination by the Distribution Company that the aggregate capacity of all Class I, II, III, and Neighborhood Net Metering Facilities, whose Host Customers are receiving net metering services under this net metering tariff, has reached one percent of the Distribution Company's highest historical peak load. Immediately following approval of this tariff by the Department, the Distribution Company will post, to the Distribution Company's website, the Distribution Company's highest historical peak load. Each year by February 1 the Distribution Company will update the Distribution Company's highest historical peak load on the Distribution Company's website and with an informational filing to the Department. Additional applications may be accepted, for incremental aggregated capacity associated with one percent of prospective increases in the Distribution Company's peak load. The calculation of aggregated capacity shall be in accordance with 220 C.M.R. 18.07.

Section 1.10 Renewable Energy and Environmental Attributes

The provision of net metering services does not entitle Distribution Companies to ownership of, or title to, the renewable energy or environmental attributes, including renewable energy certificates, associated with any electricity produced by a net metering facility.

Section 1.11 Dispute Resolution

The Dispute Resolution provisions included in the Distribution Company's Interconnection Tariff in Section 9.0 shall be available for the purpose of resolving disputes related to the

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operation of this tariff between the Distribution Company and Host Customers, including whether the Distribution Company has accurately allocated Net Metering Credits consistent with a Host Customer's written designation in Schedule Z to the Distribution Company's Interconnection Tariff. The Distribution Company shall not be responsible for resolving disputes between the Host Customer and those Customers to whom the Host Customer is allocating Net Metering Credits.



## APPENDIX J: Detailed Production Schedule

PVSYST V5.21					16/12/10	Page 1/5
Amherst Landfill 4.75MW PV System Bosch Solar Energy						
Grid-Connected System: Simulation parameters						
Project :		Amherst 4MW				
Geographical Site		WORCHESTER		Country	USA	
Situation		Latitude	42.3°N	Longitude	71.9°W	
Time defined as		Legal Time	Time zone UT-5	Altitude	301 m	
		Albedo	0.20			
Meteo data :		WORCHESTER, NREL US TMY2				
Simulation variant :		Amherst 4.74MW v2				
		Simulation date	16/12/10 16h43			
Simulation parameters						
Collector Plane Orientation		Tilt	20°	Azimuth	0°	
Horizon		Average Height	7.7°			
Near Shadings		No Shadings				
PV Arrays Characteristics (3 kinds of array defined )						
PV module		Si-mono	Model	230Wp c-Si M 60-16		
		Manufacturer	Bosch			
Array#1: Number of PV modules		In series	28 modules	In parallel	276 strings	
Total number of PV modules		Nb. modules	7728	Unit Nom. Power	230 Wp	
Array global power		Nominal (STC)	1777 kWp	At operating cond.	1552 kWp (50°C)	
Array operating characteristics (50°C)		U mpp	+/-364 V	I mpp	2131 A	
Array#2: Number of PV modules		In series	28 modules	In parallel	276 strings	
Total number of PV modules		Nb. modules	7728	Unit Nom. Power	230 Wp	
Array global power		Nominal (STC)	1777 kWp	At operating cond.	1552 kWp (50°C)	
Array operating characteristics (50°C)		U mpp	+/-364 V	I mpp	2131 A	
Array#3: Number of PV modules		In series	28 modules	In parallel	186 strings	
Total number of PV modules		Nb. modules	5208	Unit Nom. Power	230 Wp	
Array global power		Nominal (STC)	1198 kWp	At operating cond.	1046 kWp (50°C)	
Array operating characteristics (50°C)		U mpp	+/-364 V	I mpp	1436 A	
Total Arrays global power		Nominal (STC)	4753 kWp	Total	20664 modules	
		Module area	33889 m²	Cell area	29818 m²	
Inverter		Model	Solaron 500			
		Manufacturer	Advanced Energy Industries, Inc.			
		Operating Voltage	+/-330-550 V	Unit Nom. Power	500 kW AC	
Array#1:		Number of Inverter	3	Total Power	1500 kW AC	
Array#2:		Number of Inverter	3	Total Power	1500 kW AC	
Array#3:		Number of Inverter	2	Total Power	1000 kW AC	
Total		Number of Inverter	8	Total Power	4000 kW AC	
PV Array loss factors						
Thermal Loss factor		Uc (const)	25.0 W/m²K	Uv (wind)	1.2 W/m²K / m/s	
=> Nominal Oper. Coll. Temp. (G=800 W/m², Tamb=20°C, Wind velocity = 1m/s.)		NOCT		47 °C		
Wiring Ohmic Loss		Array#1	5.8 mOhm	Loss Fraction	1.5 % at STC	
		Array#2	5.8 mOhm	Loss Fraction	1.5 % at STC	
		Array#3	8.6 mOhm	Loss Fraction	1.5 % at STC	
		Global		Loss Fraction	1.5 % at STC	

Amherst Landfill 4.75MW PV System

Bosch Solar Energy

Grid-Connected System: Simulation parameters (continued)

Array Soiling Losses		Loss Fraction	4.0 %
Module Quality Loss		Loss Fraction	0.5 %
Module Mismatch Losses		Loss Fraction	2.0 % at MPP
Incidence effect, ASHRAE parametrization	IAM = 1 - bo (1/cos i - 1)	bo Parameter	0.05

User's needs :

Unlimited load (grid)

Amherst Landfill 4.75MW PV System  
Bosch Solar Energy

Grid-Connected System: Horizon definition

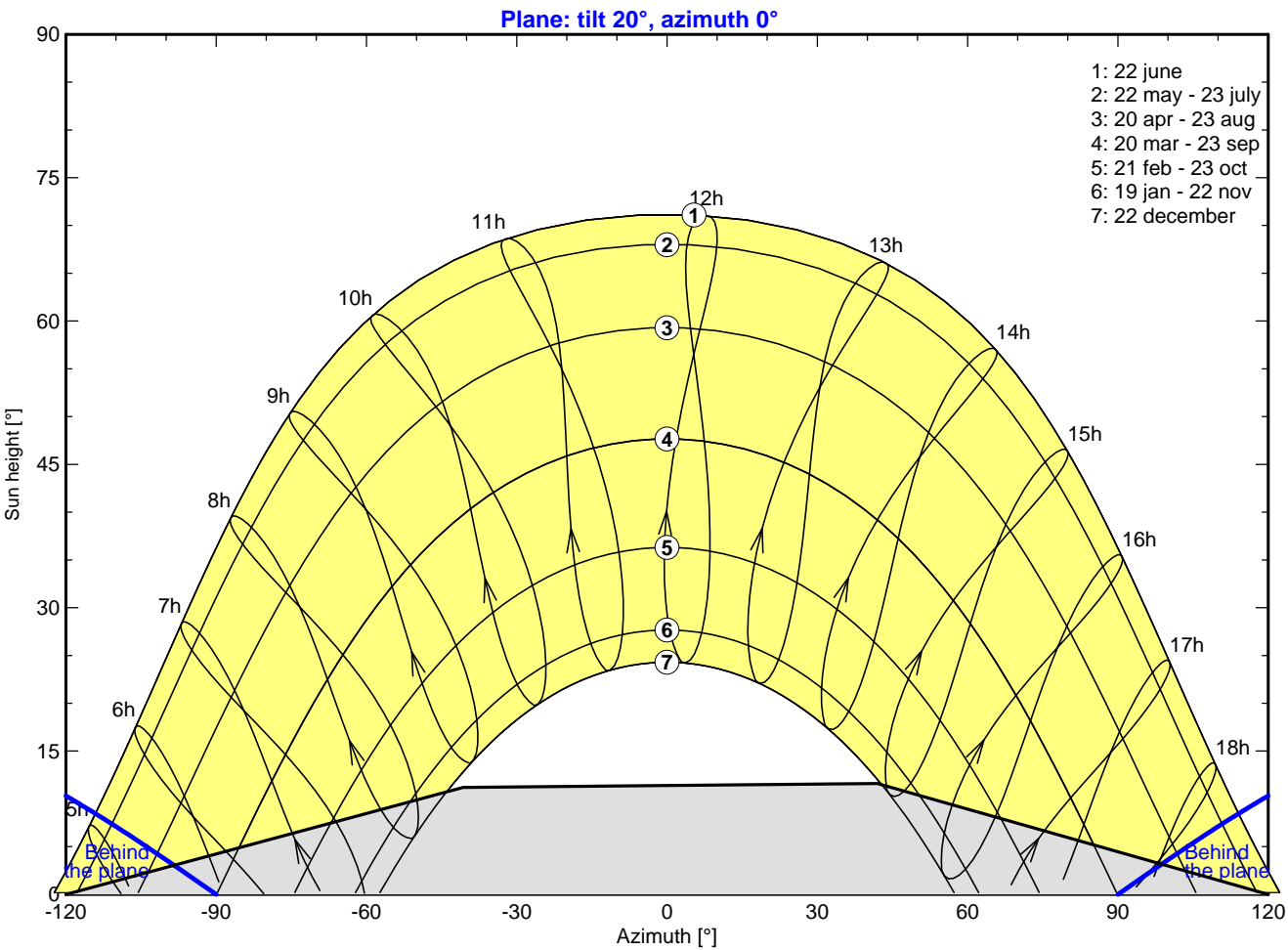
Project : Amherst 4MW  
Simulation variant : Amherst 4.74MW v2

Main system parameters	System type	Grid-Connected		
	Average Height	7.7°		
	PV Field Orientation	tilt	20°	azimuth 0°
	PV modules	Model	230Wp c-Si M 60-16	Pnom 230 Wp
	PV Array	Nb. of modules	20664	Pnom total 4753 kWp
	Inverter	Model	Solaron 500	Pnom 500 kW ac
	Inverter pack	Nb. of units	8.0	Pnom total 4000 kW ac
	User's needs	Unlimited load (grid)		

Horizon	Average Height	7.7°	Diffuse Factor	0.94
	Albedo Factor	100 %	Albedo Fraction	0.45

Height [°]	0.0	11.2	11.6	0.0
Azimuth [°]	-120	-41	42	120

Horizon line at WORCHESTER



## Amherst Landfill 4.75MW PV System

### Bosch Solar Energy

## Grid-Connected System: Main results

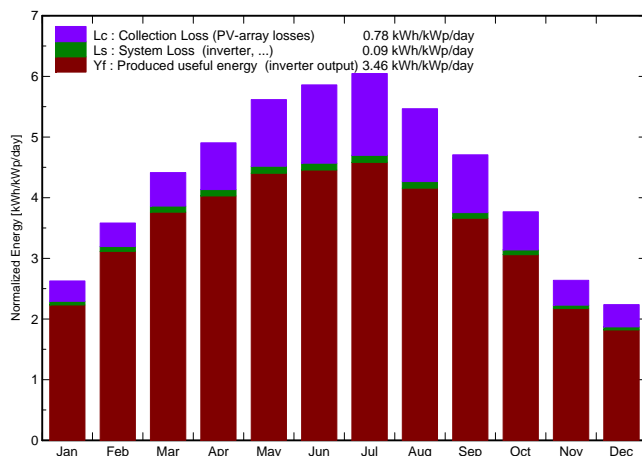
**Project :** Amherst 4MW  
**Simulation variant :** Amherst 4.74MW v2

<b>Main system parameters</b>	<b>System type</b>	<b>Grid-Connected</b>
<b>Horizon</b>	<b>Average Height</b>	7.7°
PV Field Orientation	tilt	20°
PV modules	Model	230Wp c-Si M 60-16
PV Array	Nb. of modules	20664
Inverter	Model	Solaron 500
Inverter pack	Nb. of units	8.0
User's needs	Unlimited load (grid)	
	azimuth	0°
	Pnom	230 Wp
	Pnom total	<b>4753 kWp</b>
	Pnom	500 kW ac
	Pnom total	<b>4000 kW ac</b>

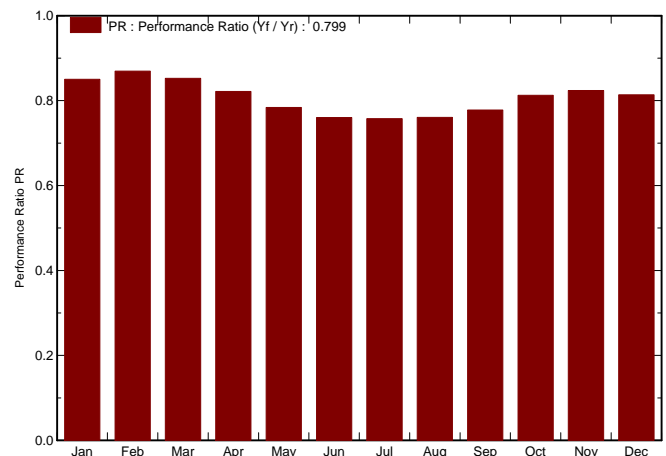
### Main simulation results

**System Production**      **Produced Energy** **5995 MWh/year**      Specific prod. 1261 kWh/kWp/year  
**Performance Ratio PR** 79.9 %

Normalized productions (per installed kWp): Nominal power 4753 kWp



Performance Ratio PR



### Amherst 4.74MW v2

#### Balances and main results

	GlobHor kWh/m <sup>2</sup>	T Amb °C	GlobInc kWh/m <sup>2</sup>	GlobEff kWh/m <sup>2</sup>	EArray kWh	E_Grid kWh	EffArrR %	EffSysR %
January	57.8	-4.74	81.4	74.1	337741	328992	12.24	11.92
February	79.8	-3.77	100.3	93.4	425249	414641	12.51	12.20
March	117.7	1.02	136.8	129.4	569175	554369	12.28	11.96
April	137.8	6.43	147.1	139.0	589613	574335	11.83	11.52
May	171.5	13.88	174.1	164.6	665788	648757	11.29	11.00
June	177.6	18.35	175.8	165.8	651659	635215	10.94	10.66
July	187.6	20.06	187.5	177.3	692150	675051	10.89	10.63
August	162.0	19.33	169.5	160.6	628364	612628	10.94	10.67
September	124.6	16.35	141.2	133.8	535318	521939	11.19	10.91
October	93.6	9.58	116.8	110.1	462418	451014	11.68	11.40
November	58.7	4.19	79.2	73.2	317909	310032	11.85	11.56
December	48.0	-1.18	69.4	61.8	275390	268284	11.71	11.41
Year	1416.5	8.36	1579.0	1482.9	6150775	5995257	11.49	11.20

Legends:	GlobHor	Horizontal global irradiation	EArray	Effective energy at the output of the array
	T Amb	Ambient Temperature	E_Grid	Energy injected into grid
	GlobInc	Global incident in coll. plane	EffArrR	Effic. Eout array / rough area
	GlobEff	Effective Global, corr. for IAM and shadings	EffSysR	Effic. Eout system / rough area

## Amherst Landfill 4.75MW PV System

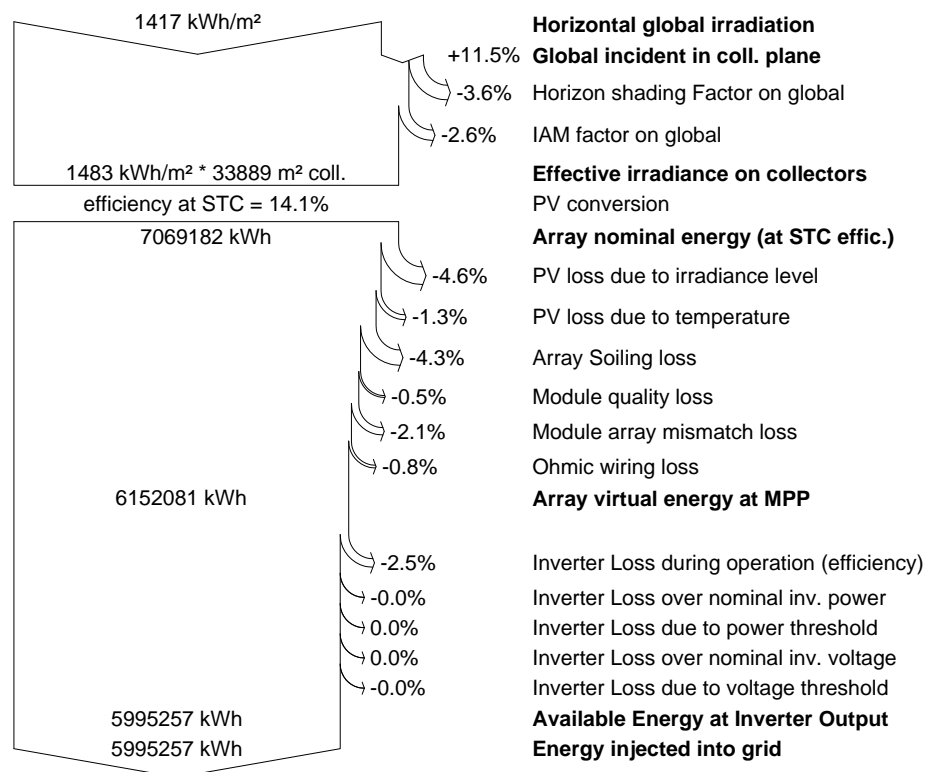
### Bosch Solar Energy

## Grid-Connected System: Loss diagram

**Project :** Amherst 4MW  
**Simulation variant :** Amherst 4.74MW v2

<b>Main system parameters</b>	<b>System type</b>	<b>Grid-Connected</b>	
<b>Horizon</b>	<b>Average Height</b>	7.7°	
<b>PV Field Orientation</b>	<b>tilt</b>	20°	<b>azimuth</b> 0°
<b>PV modules</b>	<b>Model</b>	230Wp c-Si M 60-16	<b>Pnom</b> 230 Wp
<b>PV Array</b>	<b>Nb. of modules</b>	20664	<b>Pnom total</b> <b>4753 kWp</b>
<b>Inverter</b>	<b>Model</b>	Solaron 500	<b>Pnom</b> 500 kW ac
<b>Inverter pack</b>	<b>Nb. of units</b>	8.0	<b>Pnom total</b> <b>4000 kW ac</b>
<b>User's needs</b>	<b>Unlimited load (grid)</b>		

### Loss diagram over the whole year



## APPENDIX K: Bosch Solar Energy AG Qualifications



# Company Presentation

## Bosch Solar Energy



Solar Energy

1  
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# Company Presentation 2010

Bosch Group



Solar Energy Business Sector



Products and Technology



Current Projects at Bosch Solar Energy



Solar Energy

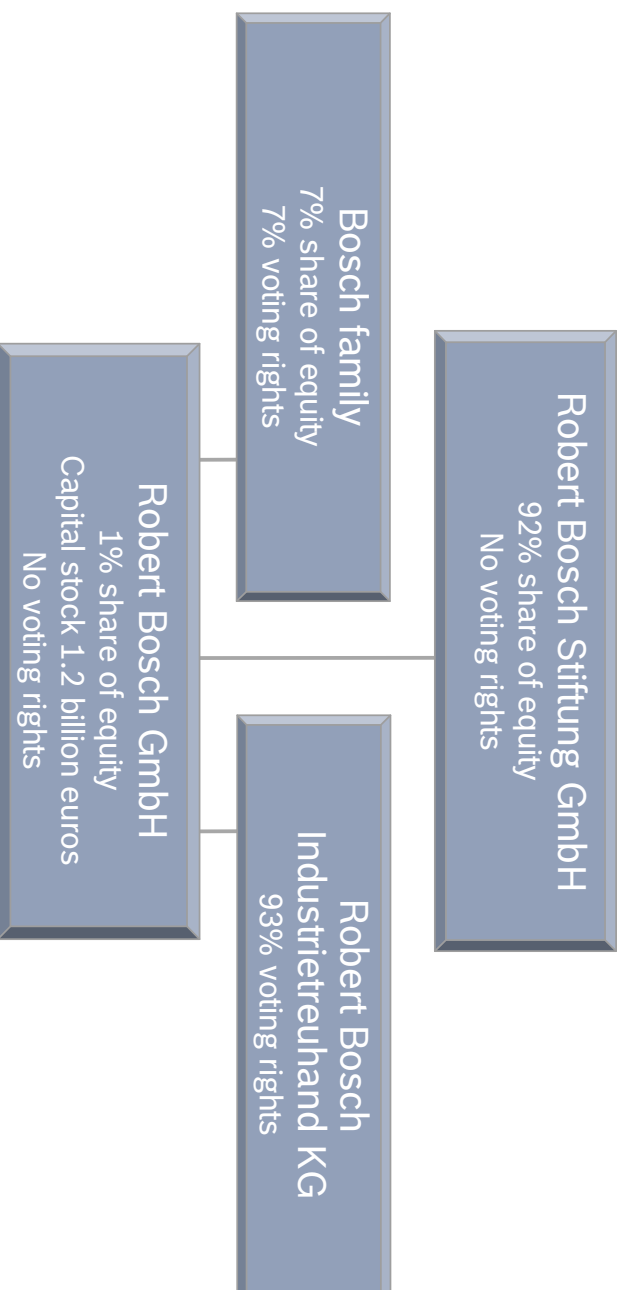
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**BOSCH**

# Ownership structure



## Bosch Group – facts and figures

### Key data

	2008	2009
Sales revenue*	45,127	38,174
Associates <sup>1)</sup>	281,717	270,687
located in Germany	114,360	111,710
located outside Germany	167,357	158,977
Capital expenditure*	3,276	1,892
Research and development cost*	3,889	3,603
Profit before tax*	942	-1,197
Profit after tax*	372	-1,214

<sup>1)</sup> As per January 1, 2009/2010

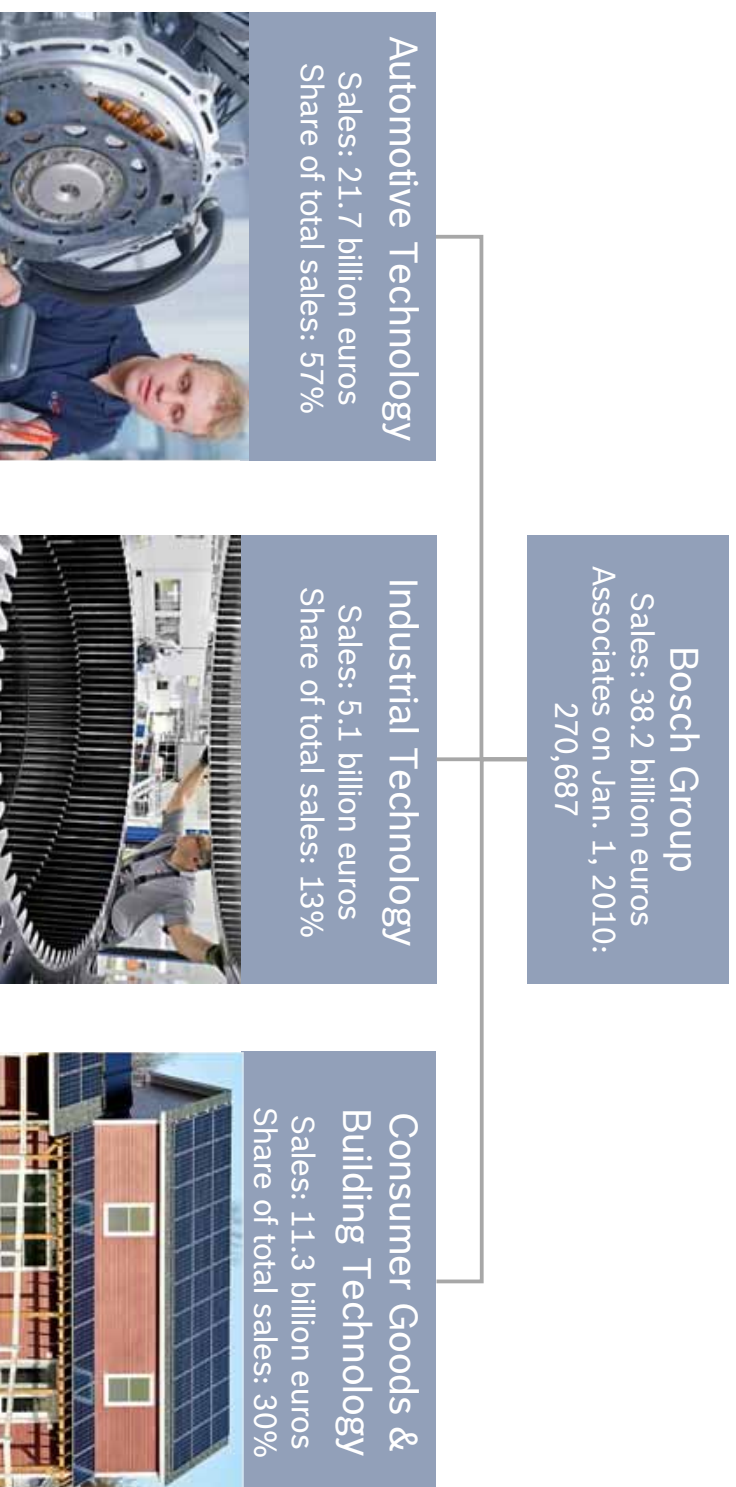
\* Currency figures in millions of euros

#### Solar Energy



## Bosch Group – facts and figures

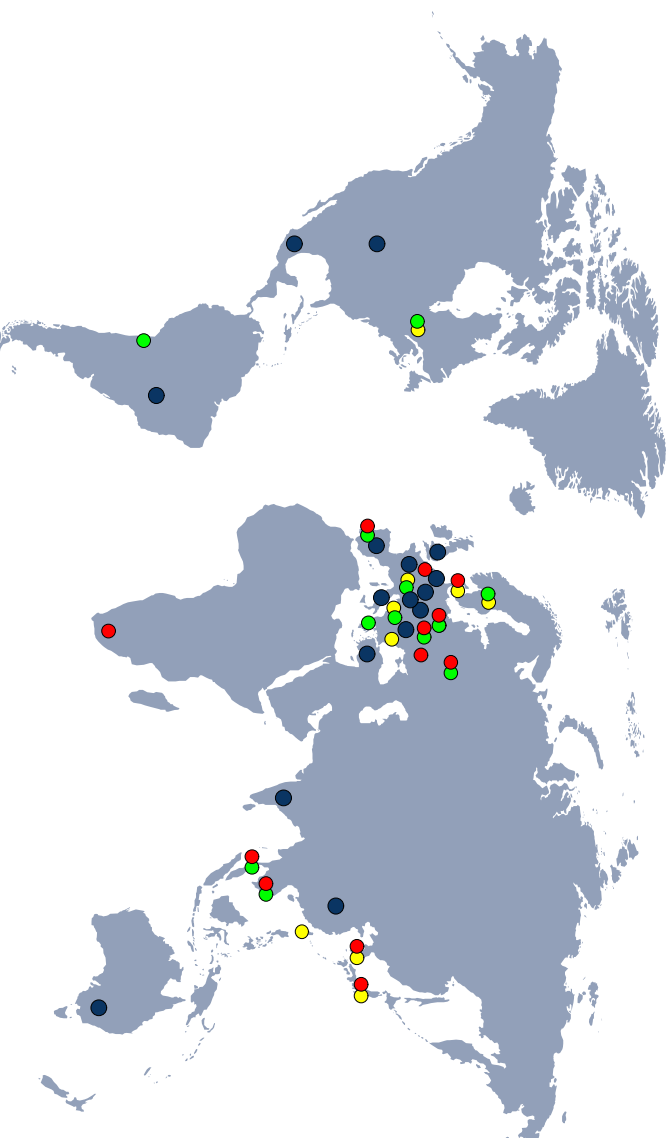
# Structure of the Bosch Group



## Solar Energy

## Bosch Group – facts and figures

### International manufacturing sites



RB	:	293	manufacturing sites in	36	countries	● = ●●●
UBK	:	135	manufacturing sites in	28	countries	
UBI	:	100	manufacturing sites in	25	countries	
UBG	:	84	manufacturing sites in	28	countries	

As per January 2010

#### Solar Energy





## Bosch Group

# Structure and Divisions of the Bosch Group

Automotive Technology

Industrial Technology

Consumer Goods and  
Building Technology

### Gasoline Systems

### Diesel Systems

### Chassis Systems Brakes

### Chassis Systems Control

### Energy and Body Systems

### Starter Motors and Generators

### Car Multimedia

### Automotive Electronics

### Automotive Aftermarket

### ZF Lenksysteme



### Bosch Rexroth

Electric drives and controls, hydraulics, assembly and linearmotion technology, pneumatics

### Packaging Technology

Packaging machines and lines for the confectionery, food, and pharmaceuticals industries

### Solar Energy

Solar cells, photovoltaic modules

### Power Tools

Power tools for the building trade, industry, and the DIY sector; accessories, garden tools

### Thermotechnology

Heating units and boilers, open-loop and closed-loop control systems

### Household Appliances

Cooking, dishwashing, washing, drying, cooling, freezing

### Security Systems

Fire and burglar alarms, video surveillance systems

### Solar Energy

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# Bosch Values

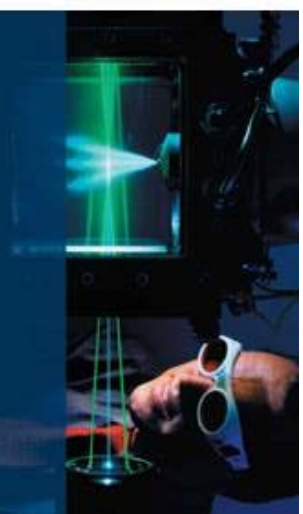
1. Future and Result Focus
2. Responsibility
3. Initiative and Determination
4. Openness and Trust
5. Fairness
6. Reliability, Credibility and Legality
7. Cultural Diversity





# Bosch Core Competencies

- Strategic Farsightedness
- Innovative Strength
- Efficient Processes
- Quality and Reliability
- Global Presence
- Human Resources Development



# What is Bosch doing to protect the environment?

## Environmental management to ISO 14001 at all manufacturing sites

- Heat recovery
- Reduction of water consumption / waste
- Power-saving measures
- Use of solvents phased out
- Similar requirements made of suppliers

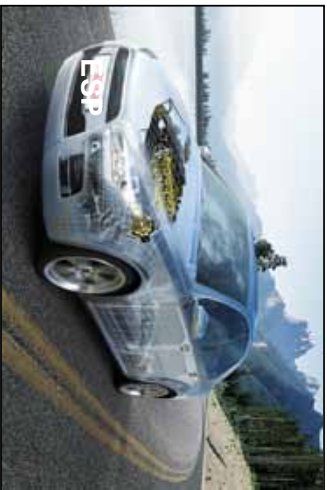
Some 45 percent of our research and development expenditure goes into products that protect the environment and conserve resources. In 2009 alone, this amounted to more than 1.5 billion euros.



## Solar Energy



# Saving energy – a Bosch strength



powertrains



solar heating systems



photovoltaics



gearboxes for wind turbines



innovative power tools  
with lithium-ion technology



energy-efficient  
household appliances

## Solar Energy

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# Company Presentation 2010



Bosch Group



Solar Energy Business Sector



Products and Technology



Current Projects at Bosch Solar Energy

Solar Energy

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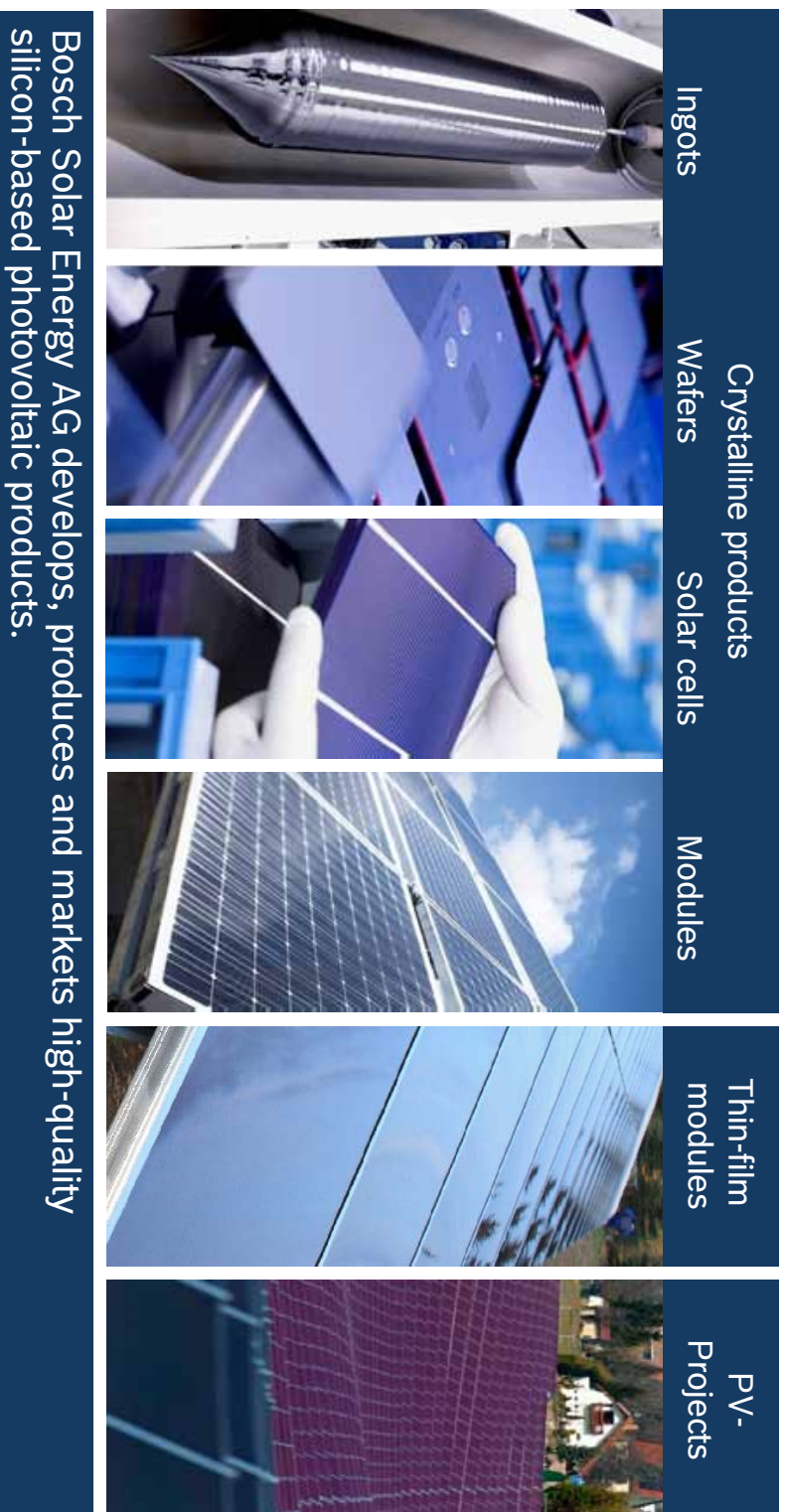


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## Solar Energy

# Bosch – Solar Energy



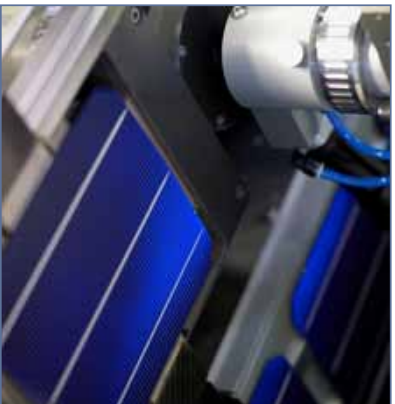
Solar Energy



### At a glance

- From small-scale plants for single-family homes to finished large-scale photovoltaic projects – Bosch Solar Energy offers high-quality solar cells and modules for photovoltaic power generation.
- With its high-efficiency crystalline and thin-film products, Bosch Solar Energy focuses very deliberately on the sustainable and environmentally friendly form of silicon-based solar power generation.

Crystalline Photovoltaics



Thin-film Photovoltaics



## Solar Energy

# Management Board



**Holger von Hebel**

CEO/CFO;  
Corporate Strategy  
Development,  
Finance/Controlling,  
Human Resources,  
Corporate  
Communications, IT, Legal  
Affairs and Post Merger  
Integration



**Dr. Volker Nadenau**

CTO;  
Research & Development,  
Process Development



**Jürgen Pressl**

COO;  
Manufacture of Ingots,  
Wafers, Solar Cells and  
Crystalline Solar Modules,  
Purchasing/Supply Chain  
Management, Quality  
Control



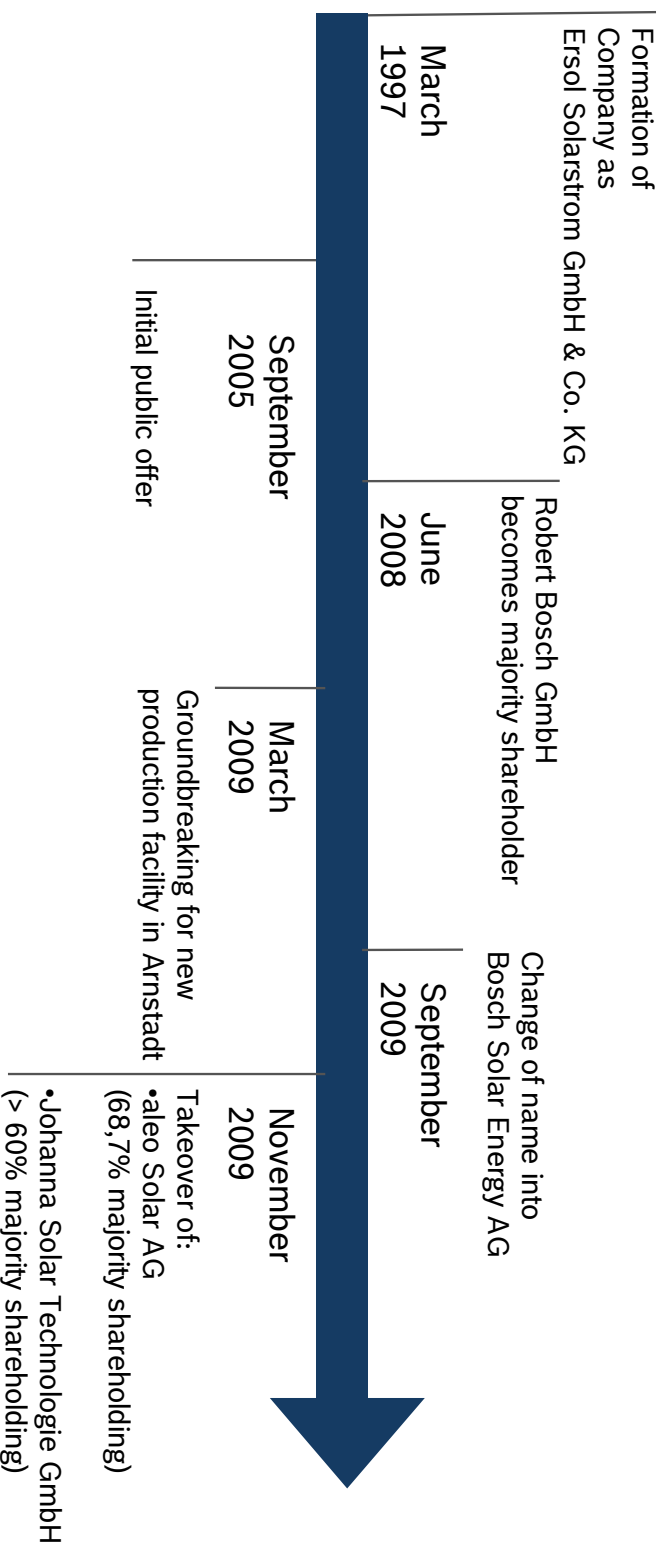
**Peter Schneidewind**

CSO;  
Sales, Marketing, Product  
Management

**Solar Energy**



# Milestones 1997 - 2009





## Solar Energy

# Worldwide Locations



Bosch Solar Energy AG  
(Erfurt, Germany)

Bosch Solar Thin Film GmbH  
(Arnstadt, Germany)

Bosch Solar Modules GmbH  
(Erfurt, Germany)



Shanghai Electric Solar  
Energy Co. Ltd. (SESE)  
(Shanghai, P.R.China)\*

\*Joint Venture with Shanghai Environment  
Protection Complete Engineering Co. Ltd. (35%)  
and Shanghai Silverstone Terry Investment Co.  
Ltd. (10%)

## Solar Energy

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## Solar Energy

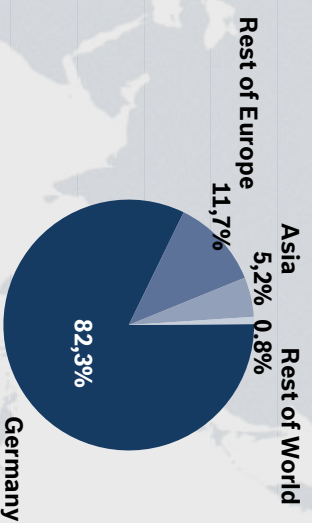
# Business Sector Solar Energy

## Facts and Figures

### Key Data 2009

Sales	263 mio. euros
R&D expenses	6 mio. euros
Investments	211 mio. euros
Employees	1,458

### Sales 2009 by Region

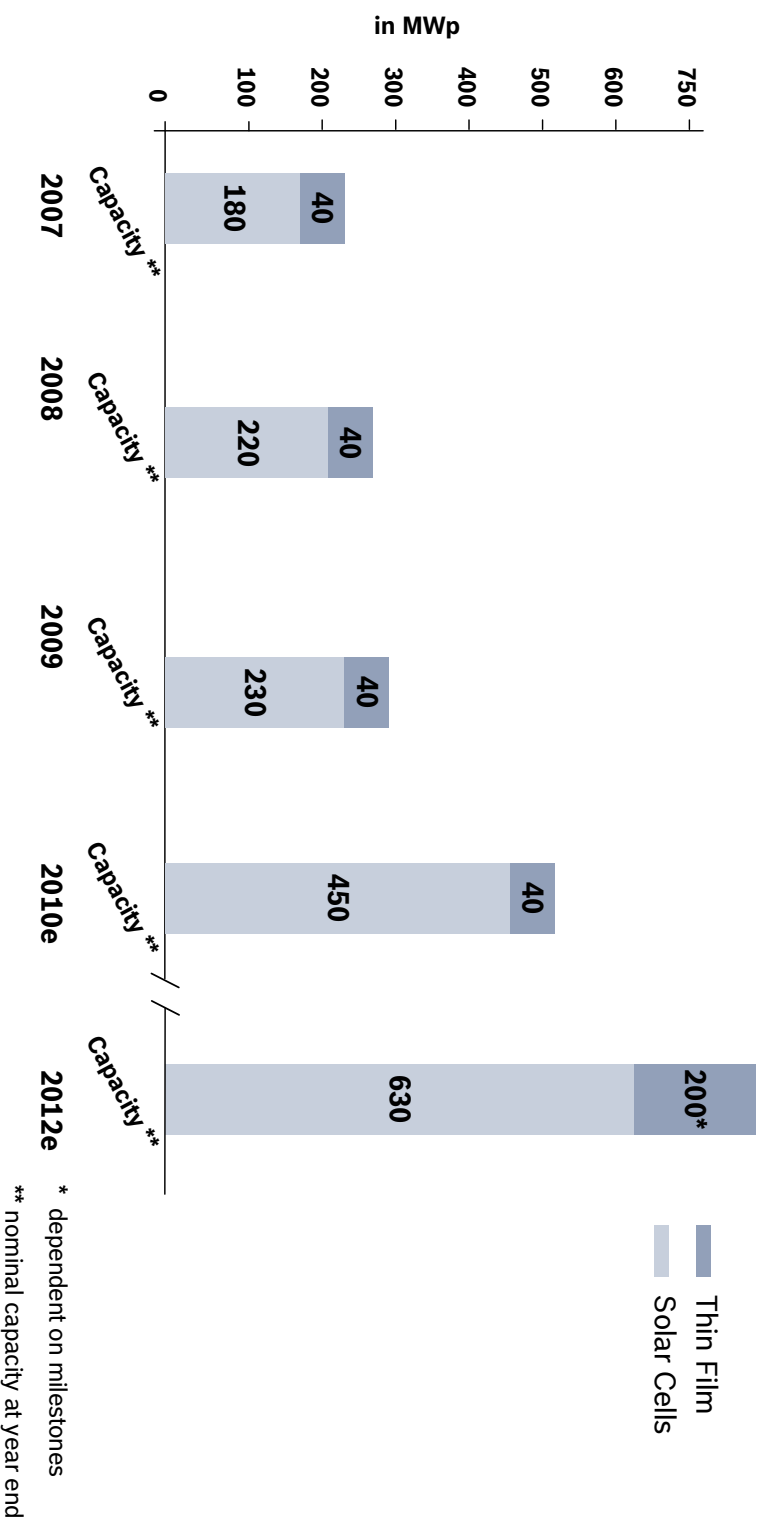


Solar Energy



## Solar Energy

# Estimates for Bosch Solar Energy's expected capacities



### Solar Energy

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# Company Presentation 2010

Bosch Group



Solar Energy Business Sector



Products and Technology



Current Projects at Bosch Solar Energy



Solar Energy

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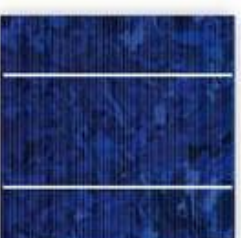
**BOSCH**

# Crystalline Product Segment – Solar Cells

- Products: Multi- und monocrystalline solar cells with high efficiencies of up to 17.5% (mono) and 16% (multi); → currently approximately 90% share of monocrystalline cells
- Bosch Solar Energy monocrystalline cells are widely recognized as some of the most efficient on the market; this large monocrystalline solar cell with a 205mm diagonal will make optimal use of the space in your modules
- Exceptionally stable performance thanks to purest silicon and to high-resistance monocrystalline wafers, produced in-house
- High annual revenue is achieved even with not optimal solar radiation due to the excellent low-light performance of Bosch monocrystalline cells.



**Bosch Solar Cell  
M 3BB**



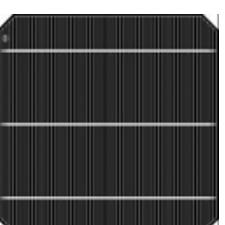
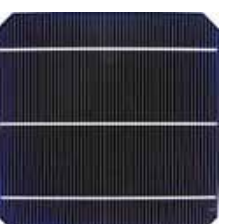
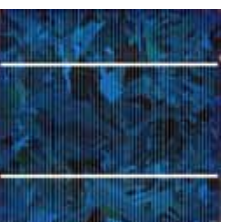
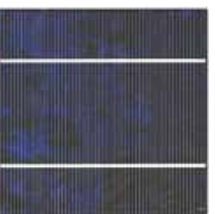
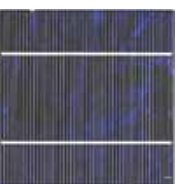
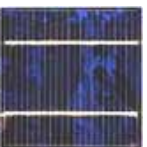
**Bosch Solar Cell P**

## Products and Technology

# Crystalline Product Segment – Product Evolution

### Multicrystalline

### Monocrystalline



Name	Solarzelle 100	125/3C	E6	E6+	E6M+ 3BB	Bosch Solar Cell M 3BB
Size	100mm	125mm	150mm	156mm	156mm 3BB	156mm 3BB
Market launch	1999	2000	2003	2004	2006	2010
Wp per Cell	1.10Wp	2.46Wp	3.47Wp	3.75Wp	4.04Wp	4.29Wp

## Solar Energy



# Crystalline Product Segment – Modules

- Photovoltaic modules based on high-efficiency mono- and multicrystalline silicon solar cells in the size 156mm x 156 mm
- High efficiency and excellent value for money.
- High efficiency per module due to predominant use of monocrystalline solar cells (up to 240 Wp/ 17.0% cell and 14.6% module)
- High product quality according to European quality standards
- High annual return: very good low-light performance
- Safe and easy installation: TÜV certified modules and good mechanical stability due to deployment of high-quality materials
- Designed primarily for use in grid-connected systems and decentralized supply systems





# **Solar power plants**

Bosch Solar Energy AG



# Solar power plants

## Bosch Solar power plants – all components from a single source.

Bosch Solar Energy develops sites suitable for the installation of solar power plants on behalf of private and institutional investors worldwide. Bosch Solar Energy plans all the options for ground mounted, rooftop and building integrated system with innovative technologies based on yield and cost effectiveness calculations and prepares an overall technical design for all system components.

### A complete solar power plant from Bosch!

Bosch solar power plants consist of a complete solution from a single source: from Bosch's own solar modules and mounting systems through to the installation of a complete solar park. Twenty-five employees can install on average up to 5,000 thin-film modules per day, with a realistic breakage rate of 0.05 percent.

### Optimum quality management!

We carry out comprehensive quality control on our Bosch solar power systems at all stages, from planning and commissioning right through to operational management. Quality testing is assured by voluntary certification through organizations such as the Fraunhofer Institute.

### Financially secure!

By using components exclusively from Bosch, the entire project can be implemented flexibly and efficiently while taking local circumstances into consideration. Bosch is also in a strong financial position as a company and has exceptional credit ratings.



# Solar power plants

## You benefit from our solar power plants

### Optimum quality management!

Guaranteed:

- ▶ Quality management for Bosch solar power plants takes place throughout the construction phase.
- ▶ Comprehensive quality control on all components is ensured from planning and initial operation right through to operational management.
- ▶ Quality testing is assured by optional certification through organizations such as the Fraunhofer Institute.

### Financially secure!

Guaranteed:

- ▶ Use of existing Bosch networks
- ▶ Secure warranty through high financial power
- ▶ By using components exclusively from Bosch, the entire project can be implemented efficiently while taking local circumstances into consideration.
- ▶ Bosch is also in a strong financial position and has exceptional credit ratings.



## **References**

Bosch Solar Energy AG

# Solar power plants

Germany, Stuttgart



System type:	Rooftop system
Year of commissioning:	2009
Number of modules:	4 247
PV system output:	955 kWp
Type of module:	Bosch Solar Module c-Si M 60/225Watt
Inverters:	SMA
Annual electricity output:	870 000 kWh
Total area (in m <sup>2</sup> ):	7 000
Electricity generation in 4-person households/year:	250

So you can stay up to date with all the latest developments, we will notify you on our website when the B2B shop is updated.

Version: April 2010



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Invented for life



# Solar power plants

## Germany, Ronneburg



System type:	Ground mounted system
Year of commissioning:	2009
Number of modules:	49 246
PV system output:	4.5 MWp
Type of module:	Bosch Solar Module a-Si plus, Bosch Solar Module $\mu$ m-Si plus
Inverters:	SMA
Annual electricity output:	4 002 750 kWh
Total area (in m <sup>2</sup> ):	234 000
Electricity generation in 4-person households/year:	1 144
CO <sub>2</sub> savings/year:	2 646 000 kg

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# Solar power plants

## Germany, Erfurt Freight Transport Center (GVZ)



System type:	Ground mounted system
Year of commissioning:	2009
Number of modules:	21 898
PV system output:	2.1 MWp
Type of module:	Bosch Solar Module a-Si plus, Bosch Solar Module $\mu$ m-Si plus
Inverters:	SMA
Annual electricity output:	1 788 000 kWh
Total area (in m <sup>2</sup> ):	130 000
Electricity generation in 4-person households/year:	511
CO <sub>2</sub> savings/year:	1 182 000 kg

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# Solar power plants

Germany, Fraureuth, Saxony



System type:	Ground mounted system
Year of commissioning:	2009
Number of modules:	10 538
PV system output:	2 423 MWp
Type of module:	Bosch Solar Module c-Si M 60
Inverters:	SMA
Annual electricity output:	2 400 750 kWh
Total area (in m <sup>2</sup> ):	60 814
Electricity generation in 4-person households/year:	550
CO <sub>2</sub> savings/year:	1 680 000 kg

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Version: April 2010



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## APPENDIX L: Tighe & Bond Qualifications

## FIRM OVERVIEW

### Section 1 Firm Overview

#### 1.1 Engineering History

Our Company was founded in 1911 by James Tighe, well respected for his role in developing the water supply, distribution and treatment system for the rapidly growing city of Holyoke, Massachusetts. In 1926, he formed a partnership with Philip Bond, who added expertise in municipal engineering.



Over the years, Tighe & Bond has evolved to specialize in environmental engineering and consulting, focusing on water, wastewater, solid waste and hazardous waste, while continuing to provide expert civil engineering services. We have further enhanced our service offerings to include Geographic Information Systems (GIS), geotechnical, structural and electrical engineering. Known for designing innovative strategies for water systems, residuals management and remediation, the firm has provided consulting services to a wide variety of government, institutional and industrial clients across the region.

One of the oldest continuously operating engineering firms in the Northeast, Tighe & Bond has built a reputation upon the technical knowledge, experience and capabilities we bring to each project we undertake, as well as the service we provide. Seasoned project managers, supported by project directors (principals of the firm) and experienced engineers and scientists on each and every project assure continuity, accountability, and a high quality service.

#### 1.2 Solid Waste

Well-engineered solid waste management plans and facilities are necessary for communities to deal with rising disposal costs and increasing environmental regulation. Tighe & Bond develops comprehensive, innovative strategies to help communities and private developers plan for current and future solid waste disposal needs, including landfills, transfer stations, and procurement of transportation and disposal contracts. Volume reduction tactics, such as post-consumer recycling and composting, are an integral part of our plans. We engineer new landfills and expansions of existing landfills from initial surveys and hydrogeologic studies through design, construction, and operational assistance. Closure plans include cap design, stormwater management and sometimes landfill gas collection and treatment systems and solar PV arrays as well as environmental monitoring systems. Our team of experts can handle permitting, construction oversight, and ongoing post closure monitoring.



Tighe & Bond designed a comprehensive site assessment and closure of a 44-acre landfill in Westfield, MA, incorporating an innovative active gas collection system for power generation and reclamation of costs.

### MISSION

**To provide sound, creative, and sustainable solutions to diverse civil engineering and environmental problems, emphasizing personal service to our clients, while bringing financial and professional rewards to our employees.**

## FIRM OVERVIEW

### 1.3 Environmental, Health and Safety Services

Tighe & Bond's environmental expertise spans many disciplines, and allows us to deliver invaluable services to our clients. With environmental engineers and scientists, Massachusetts Licensed Site Professionals, Connecticut Licensed Environmental Professionals, certified industrial hygienists and certified safety professionals on staff, we provide expert advice to help organizations and communities comply with complex, changing federal and state regulations and avoid costly penalties and fines. We conduct audits to evaluate current compliance status and work with clients to develop comprehensive environmental management systems tailored to minimize regulatory risk. We also address our clients' remediation needs, assessing sites for potential contamination and designing innovative, cost-effective solutions for remediation of groundwater and soil. The firm provides emergency response and due diligence, and consults on projects from Brownfields to underground storage tanks. We also design and build turnkey remediation systems, and are often called to provide expert testimony and litigation support.



At Malden Mills, the worst fire-related disaster in Massachusetts' history, Tighe & Bond supervised a fast-tracked remediation strategy that incorporated recycling for cost minimization. We continue to advise Malden Mills on environmental, health and safety compliance issues, and provide additional services that include toxics use reduction planning and training.

### 1.4 Site Development and Civil Engineering

For close to a hundred years, Tighe & Bond has engineered the infrastructure of countless cities and towns throughout New England. We've designed roads, bridges, and drainage management systems, dams, industrial parks and academic facilities and all the utilities they require. We provide surveying and planning services, cost-effective design, bid supervision and construction oversight. Regulatory experts on staff help ensure that permitting is achieved as smoothly and swiftly as possible with federal, state and local authorities.



Tighe & Bond provided engineering services for street beautification, roadway reconstruction and infrastructure improvements including water, sewer and drainage for the town of Erving, MA.

### 1.5 Geographic Information Systems (GIS)

Tighe & Bond provides GIS services to a wide range of clients including municipalities, water and sewer utilities, state and federal government agencies, and private businesses. Our staff has experience in a wide variety of vendor applications such as ESRI, AutoDesk, Intergraph, and Bentley. We have expertise in performing Needs Assessment studies, customized application development including desktop, server, and web applications, data conversion, and analysis. Tighe & Bond is an ESRI Business Partner that provides a close working relationship with one of the most popular GIS software vendors.



For the Town of New Canaan, Tighe & Bond converted the Town's sewer system map from an overall schematic plan of the system.



## FIRM OVERVIEW

### 1.6 Current Expertise

More than 200 seasoned professionals staff Tighe & Bond; this includes engineers, environmental scientists and hydrogeologists. Working in teams, they share diverse expertise to benefit our clients. Professional registrations cover a wide range of disciplines; personnel specialize in the following areas:

- Civil Engineering
- Demolition Specifications
- Electrical Engineering
- Environmental Engineering
- Geographic Information Systems (GIS)
- Geotechnical Engineering
- Health & Safety
- Instrumentation & Control
- Mechanical/HVAC
- Parking Consultancy
- Regulatory Compliance & Permitting
- Remediation
- Site Assessment
- Site Development
- Solid Waste Management
- Structural Engineering
- Traffic Engineering
- Transportation Planning
- Wastewater Management
- Water Resources Engineering

### OFFICES

53 Southampton Road, Westfield, MA 01085	413.562.1600
446 Main Street, Worcester, MA 01608	508.754.2201
4 Barlows Landing Road, Unit #15, Pocasset, MA 02559	508.564.7285
213 Court Street, Suite 900, Middletown, CT 06457	860.704.4760
1000 Bridgeport Avenue, Suite 320, Shelton, CT 06484	203.712.1100

## PROJECT EXPERIENCE

### Section 2 Project Experience

#### 2.1 General

Tighe & Bond is a medium-sized engineering firm that specializes in environmental engineering. Tighe & Bond has been intensively involved in all phases of planning, evaluation, design, permitting, construction, assessment and operations of solid waste management facilities. For post closure uses of capped landfill our staff have permitted and designed parks, fields, golf courses and solar PV arrays. Our work has been with both municipal and private/commercial clients and has been carried out in conformity with State and/or Federal guidelines. Tighe & Bond has provided solid waste engineering services throughout the State with successful projects in all four MDEP regions. We have experience with solid waste projects in Connecticut, New York, New Hampshire and Vermont as well. Within the firm, the solid waste and solar PV services group consists of twenty-two people with diverse engineering/hydrogeologic skills that have been developed by successfully completing numerous solid waste projects.

#### 2.2 Summary of Specific Solid Waste Management & Solar PV Experience

To demonstrate that we have the qualifications and experience to provide professional solid waste & Solar PV engineering services, a summary table is provided on the next page as a brief overview of the firm's experience focusing on:

- Initial Site Assessment Work
- Comprehensive Site Assessment Work
- MEPA/NEPA Impact Reports/Statements
- General Solid Waste Permitting
- Landfill Design
- Transfer Station Design
- C&D Processing Facilities
- Closure Design
- Landfill Gas Assessment/Collection/Treatment/Energy Development
- Construction Monitoring
- Environmental Monitoring
- Routine Landfill Inspection Services
- Solar PV on Landfills

## PROJECT EXPERIENCE

Tighe & Bond Solid Waste Experience														
Town/City	ISA (Initial Site Assessment)	ENF	Hydrogeologic Study (CSA)	EIR	Landfill Liner Design	Operational Assistance	Closure System Design	Solid Waste Permitting	Construction Observation	Routine Inspection Services	General Consulting Services	Landfill Gas Services	Transfer Station	Solar
Adams, MA			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Amherst, MA	✓					✓	✓		✓	✓	✓	✓		
Ashfield, MA	✓		✓											
Athol, MA	✓		✓			✓	✓	✓		✓	✓		✓	
Belchertown, MA	✓		✓				✓	✓	✓	✓		✓		
Beverly, MA			✓			✓	✓							
Blandford, MA	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	
Bridgewater, MA								✓			✓		✓	
Chester, MA	✓	✓	✓				✓	✓	✓			✓		
Chicopee, MA		✓		✓							✓			
Cummington, MA	✓		✓				✓	✓	✓		✓	✓		
Douglas, MA										✓	✓	✓		
Easthampton								✓			✓			✓
East Longmeadow, MA	✓		✓					✓	✓		✓	✓		
Erving, MA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		
Gloversville, NY			✓				✓				✓			
Goshen, MA	✓		✓				✓	✓	✓		✓	✓	✓	
Granby, MA		✓		✓							✓			
Great Barrington, MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Greenfield, MA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
Hampden, MA	✓		✓		✓	✓	✓		✓	✓	✓	✓	✓	
Hardwick, MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Hinsdale, NH			✓			✓	✓				✓			
Holland, MA	✓		✓				✓	✓	✓	✓		✓		
Lancaster, MA								✓			✓			✓
Lee, MA	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓
Longmeadow, MA	✓										✓			
Mattapoisett, MA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Montague, MA	✓		✓			✓	✓	✓	✓	✓	✓	✓		
Moretown, VT			✓		✓	✓	✓	✓	✓	✓	✓	✓		
New Ashford, MA			✓											
Newtown, CT			✓			✓	✓		✓			✓		



## PROJECT EXPERIENCE

### Tighe & Bond Solid Waste Experience

Town/City	ISA (Initial Site Assessment)	ENF	Hydrogeologic Study (CSA)	EIR	Landfill Liner Design	Operational Assistance	Closure System Design	Solid Waste Permitting	Construction Observation	Routine Inspection Services	General Consulting Services	Landfill Gas Services	Transfer Station	Solar
North Attleboro, MA										✓	✓	✓		
North Adams, MA							✓	✓	✓	✓	✓			✓
Northampton, MA	✓		✓				✓		✓		✓			
Otis, MA			✓				✓	✓	✓		✓	✓		
Oxford, MA						✓	✓		✓		✓			
Palmer, MA	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peabody, MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Pepperell, MA										✓	✓	✓		
Plymouth, MA	✓					✓	✓	✓			✓			
Raynham, MA			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Rochester, MA											✓	✓		
Russell, MA			✓				✓		✓			✓		
Salem, MA								✓			✓		✓	✓
Sao Paulo, Brazil	✓		✓		✓	✓	✓	✓			✓	✓	✓	✓
Scituate								✓			✓	✓	✓	✓
Shelton, CT (CRRA)										✓				
South Hadley, MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Southbridge, MA						✓		✓	✓	✓	✓		✓	
Southwick, MA								✓			✓		✓	
Springfield, MA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		
St. Johnsbury, VT	✓		✓				✓	✓			✓	✓	✓	
Templeton, MA			✓		✓	✓	✓	✓	✓	✓	✓			
Wayland	✓					✓	✓	✓	✓	✓	✓		✓	✓
Westfield, MA	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	
Westport, MA			✓			✓	✓	✓	✓	✓	✓	✓	✓	
Wilbraham, MA	✓		✓			✓		✓			✓	✓	✓	
Winchendon, MA										✓	✓	✓	✓	✓

✓ Indicates that this feature was included in the services

## PROJECT EXPERIENCE

### 2.3 Solar Energy Expertise for Developers and Integrators

Tighe & Bond provides engineering and permitting services to developers and integrators evaluating and installing ground-mounted solar systems. We provide engineering services to assist integrators and developers in preparing project scope and pro formas. Our engineering experience and development of detailed opinions of probable infrastructure and site improvement costs effectively reduce the uncertainty associated with project finances. Tighe & Bond provides the following types of engineering services for solar projects:



- Geotechnical assessment of sites for use in the selection of the photovoltaic array mounting system foundations (e.g. driven/rammed shallow piles; augured cast in place concrete footings; ballasted precast concrete; or screw-in shallow piles)
- Soil / Structure interaction assessment including: review of site conditions to identify project impediments, selection of the appropriate pile system, design, monitoring and documentation of pull out and lateral load tests, determination of maximum soil pressure loads, and development of design loads for footings
- Structural assessment of structures and review of building codes to determine allowable or recommended loads for roof-top mounted solar systems
- Site/civil design including: layout, stormwater design, sedimentation and erosion control, and development of drawings and supporting documentation required for site plan review
- Electrical engineering including: determination of interconnection and protection requirements, preparation of details for cable and conduit, circuit design, grounding design, protection schemes, and identification of appropriate transformer size and type, coordination study review and field checks, and equipment selection
- With respect to local building permit obligations, Tighe & Bond provides construction observation services for site/civil, electrical and pile installation. They also provide shop drawing review, construction affidavits, and record drawings as required.

### 2.4 Solar Energy Services for Municipalities

In addition to working with solar developers, Tighe & Bond has assisted several municipalities in the Commonwealth with the development of both roof- and ground-mounted solar energy projects. Their experience working with and for municipalities, including Easthampton, provides them with perspective from both the host municipality and the developer sides of the project. This unique attribute provides our Team with the ability to assist involved parties and enable smooth project development.

For ground-mounted installations, Tighe & Bond has used their solid waste engineering experience to assess the feasibility of siting large systems on landfills. They have a dedicated team working on the leading edge of solar development that has provided the following solar energy-related services:

- Municipality-wide surveys of potential properties for large ground-based systems

## PROJECT EXPERIENCE

- Transmission route assessment for siting in both investor-owned utility and municipal electric department service areas
- Feasibility assessments for roof- and ground-mounted systems
- Grading and access plans for site preparation for large ground-based systems
- Permitting strategies for installations

Tighe & Bond is also provide third party review services for banking institutions that are financing large rooftop solar PV projects. Our reviews can include the overall project proformas, the system performance, the structural loading on the roofing system, electrical review of the system design as well as analyzing the anticipated system outputs.

### 2.5 Summary of Recycling Experience

Tighe & Bond solid waste experience includes work with several recycling facilities in Massachusetts. Tighe & Bond provided engineering services to two Covanta Energy Corporation locations to assist with developing the Class II Recycling Programs required for Renewable Energy Credits (RECs) eligibility. The 3,000 tons per day (TPD) Covanta SEMASS Resource Recovery Facility in West Wareham and the 408 TPD Covanta Springfield/Pioneer Valley Resource Recovery Facility offer communities an alternative to landfilling their municipal solid waste. In addition to developing the Class II Recycling Programs for the Covanta SEMSS and Springfield facilities, we also oversaw completion of a waste characterization study in support of Covanta Haverhill's Class II Program.

Our Project Manager for Covanta's Class II Recycling Program, David Murphy, brings particularly unique qualifications to our team. After working at MassDEP for nine years, David oversaw and directed all permitting, design and initial construction for the new 800 ton per day \$9 million construction and demolition processing facility in Stoughton, MA.

Tighe & Bond also provided engineering services for Casella Waste Services' state-of-the-art Construction and Demolition Debris Recycling and Transfer Facility with a design capacity of 1,500 tons per day throughput. Tighe & Bond provided all the geotechnical, site, civil, structural, architectural, mechanical, and electrical engineering services for the planning, permitting, design, bidding, and construction administration of the facility located in the Recycling and Disposal Park in Southbridge, Massachusetts.

### 2.6 Environmental Consulting

Tighe & Bond is well suited to address the myriad issues involved in site assessment and remediation projects, including those related to site re-development and future use. Our firm frequently conducts environmental assessments to determine the overall regulatory compliance status and environmental liabilities of a facility. In cases where contamination is discovered at levels warranting remediation, our firm develops cost effective remedial design for soils and/or groundwater and executes that plan if requested.



Covanta Energy Corporation



Casella Waste Services Construction and Demolition Debris Recycling and Transfer Facility in Southbridge

## PROJECT EXPERIENCE

Tighe & Bond's Environmental Site Assessments (ESAs) are conducted using a phased approach, to ensure that only the necessary level of effort and resources are expended in meeting objectives. Each ESA phase is developed by utilizing data from previous phase(s). We routinely utilize innovative approaches such as direct push sampling, field screening and analytical tools, low-flow groundwater sampling, and global positioning systems (GPS). Results of investigations are presented in detailed reports that include documentation of all field activities, discussions of results, data interpretation, and laboratory reports. Detected constituents are compared to appropriate regulatory criteria, and the distribution of compounds and areas of concern are clearly presented to provide a comprehensive overview of site environmental conditions.

# ENGINEERING AND PERMITTING SERVICES FOR SOLAR ENERGY

## Massachusetts



### Client

### Various MA Municipalities

### Description

Tighe & Bond has assisted many municipalities in the Commonwealth with the development of both roof- and ground-mounted solar energy projects. For ground-based installations, we have used our solid waste engineering experience to assess the feasibility of siting large systems on landfills. Tighe & Bond has a dedicated team working on the leading edge of solar development that has provided the following solar energy-related services:

- Conducted municipality-wide surveys of potential properties for large ground-based systems
- Evaluated transmission implications for siting in both investor-owned utility and municipal electric department service areas
- Provided feasibility assessments for roof- and ground-mounted systems
- Prepared Requests for Proposals and Requests for Qualifications for publically-bid projects under MGL C. 25A
- Developed grading and access plans for site preparation for large ground-based systems
- Assessed permitting strategies for installations, including systems on landfills and within site assigned areas requiring either Minor or Major Post-Closure Use Permits

## ENGINEERING AND PERMITTING SERVICES FOR SOLAR ENERGY

### Massachusetts

- Advised on aspects of deal structures, including Power Purchasing Agreements

We are very knowledgeable on regulations that apply to solar systems as well as State incentive programs such as the Massachusetts Renewable Portfolio System Carve-Out, Solar Renewable Energy Certificates (SRECs), and net-metering.



## ENGINEERING & PERMITTING SERVICES FOR SOLAR INTEGRATORS & DEVELOPERS

Numerous Sites, Massachusetts



### Clients

### Solar Integrators and Developers in New England

### Description

Tighe & Bond provides engineering and permitting services to developers and integrators evaluating and installing ground-mounted solar systems. For these types of systems, local permitting requirements commonly include Site Plan Review as required by zoning ordinances or specific “by-right” zoning amendments for the siting of renewable energy systems. Tighe & Bond has prepared permitting requirement fatal flaw analyses in order to assist project owners in determining the viability of a site for a ground-mounted solar system. Additionally, we have significant experience preparing permits for a variety of project types.

Systems located near wetland areas may fall under local conservation commission jurisdiction and the project may require a Notice of Intent under the Massachusetts Wetlands Protection Act. At the state level, permitting or agency obligations for ground-based solar systems can include:

- A Massachusetts Qualifying Facility Certification (if Solar Renewable Energy Certificates are sought)
- Preparation of an Environmental Notification Form under the Massachusetts Environmental Protection Act



## ENGINEERING & PERMITTING SERVICES FOR SOLAR INTEGRATORS & DEVELOPERS

### Numerous Sites, Massachusetts

- Coordination with the Natural Heritage and Endangered Species Program and Massachusetts Historical Commission
- Major or Minor Post Closure Use Permits if solar systems will be sited on landfills or site assigned properties.
- Depending on the size of the project, federal permitting obligations can include compliance with the National Pollutant Discharge Elimination System General Construction Permit and development of a Stormwater Pollution Prevention Plan.
- If endangered species habitat is present onsite, compliance with the Endangered Species Act may be required.

Tighe & Bond provides engineering services to assist integrators and developers in preparing project scope and pro formas. Our engineering support and development of detailed opinions of probable infrastructure and site improvement costs reduces the uncertainty associated with project finances. We provide the following types of engineering services for solar projects:

- Geotechnical assessment of sites for use in the selection of the PV array mounting system foundations (e.g. driven/rammed shallow piles; augered cast in place concrete footings; ballasted precast concrete; or screw-in shallow piles)
- Soil / Structure interaction assessment including: review of site conditions to identify project impediments, selection of the appropriate pile system, design, supervision, and documentation of pull out and lateral load tests, determination of maximum soil pressure loads, and development of design loads for footings
- Site/civil design including: layout, stormwater design, sedimentation and erosion control, and development of drawings and supporting documentation required for site plan review
- Electrical engineering including: determination of interconnection and protection requirements, preparation of details for cable and conduit, circuit design, grounding design, protection schemes, and identification of appropriate transformer size and type, coordination study review and field checks, and equipment selection
- With respect to local building permit obligations, we serve as Engineer of Record providing construction observation services for site/civil, electrical and pile installation. We also provide shop drawing review, construction affidavits and record drawings as required.

## ENGINEERING AND PERMITTING SERVICES FOR LANDFILL POST CLOSURE

Scituate, Massachusetts



### Client

### Town of Scituate

### Description

Tighe & Bond is providing permitting, engineering, inspections and monitoring for the town's closed and capped landfill on the driftway adjacent to the municipal golf course and North River. In addition to routine landfill inspections and monitoring for landfill gas and groundwater, we have also conducted a post closure use evaluation of the capped landfill and looked at possible end uses.

Working with the town, Tighe & Bond evaluated the site for passive and active recreational uses, possible DPW storage and renewable energy. We represented the town before the MassDEP to determine permitting steps necessary to proceed with these post closure uses and presented our findings before the Scituate Board of Selectmen. Working with the town engineer and the DPW director, Tighe & Bond also has assisted with the issuance of Request for Proposal to various solar developers to solicit proposals to lease the landfill property and enter into a Power Purchase Agreement with the Town. The Landfill was capped in 1999 and has approximately 17 acres of relatively flat surface suitable for a 2 MW ground mounted solar array.

## ENGINEERING AND PERMITTING SERVICES FOR LANDFILL POST CLOSURE

### Scituate, Massachusetts

For this ground-based installation, Tighe & Bond is using its solid waste engineering experience to design a stable solar system on the flat portion of the landfill. Conventional stationary ground mount arrays are likely to be used. Tighe & Bond's dedicated engineering and permitting team will work with the selected solar developer to providing the following solar energy-related services at the Scituate Landfill:

- Assist the developer with the optimal solar panel layout on the surface of the landfill
- Evaluating the availability of transmission interconnections and implications for siting with the investor-owned utility service areas
- Providing geotechnical and landfill engineering design services for a landfill ground mount system on the capped and closed landfill
- Developing grading and access plans for site preparation for the ground-based systems. This includes preparing a storm water management plan and providing the necessary engineering design to modify the existing storm water management system
- Providing post closure use permitting services to comply with DEP's landfill regulations found at 310 CMR 19.000. Working closely with the MassDEP to provide assurances that the integrity of the landfill cap will be preserved at all times
- Providing local site design services for Planning Board approval that addresses all local issues including traffic concerns, noise, dust, setbacks, building and zoning codes, etc.
- Providing wetland delineation and local wetlands permitting services if required and if the proposed array comes within 100 feet of a jurisdictional wetlands area
- Providing full time professional engineering oversight and observation during work on the landfill cap and assisting with the preparation and submittal of a final as-built plan to MassDEP once the Solar Array is completed.

In addition to our extensive command of the landfill regulations and landfill engineering design, we are very knowledgeable on regulations that apply to solar systems as well as state incentive programs such as the Massachusetts Renewable Portfolio System Carve-Out, Solar Renewable Energy Certificates (SRECs), and net-metering.

## ENGINEERING AND PERMITTING SERVICES FOR SOLAR ARRAY ON BRIDGEWATER LANDFILL

Bridgewater, Massachusetts



### Client

**Blue Wave Development/BOSCH Solar**

### Description

Tighe & Bond has partnered with Blue Wave Development and BOSCH Solar to install a 7-acre solar array on the privately held closed and capped Chuckran Landfill in Bridgewater, Massachusetts. Tighe & Bond, working together with Blue Wave, has met several times and negotiated an acceptable permitting pathway agreement with the MassDEP to resolve a long standing dispute regarding the regulatory status of the existing clay cap. Based on this permitting agreement, the project is able to move forward and proceed into permitting for the proposed post closure use for renewable energy. The Landfill was capped in 1991 and has approximately 7 acres of flat surface suitable for a 1.25 MW ground mounted stationary solar array.

For this ground-based installation, Tighe & Bond is using its solid waste engineering experience to design a stable solar system on the flat portion of the landfill. Conventional stationary ground mount arrays are likely to be used. Tighe & Bond's dedicated engineering and permitting team will work with the selected solar developer to providing the following solar energy-related services at the Bridgewater Landfill:

- Assisting the developer with the optimal solar panel layout on the surface of the landfill



## ENGINEERING AND PERMITTING SERVICES FOR SOLAR ARRAY ON BRIDGEWATER LANDFILL

### Bridgewater, Massachusetts

- Evaluating the availability of transmission interconnections and implications for siting with the investor-owned utility service areas
- Providing geotechnical and landfill engineering design services for a landfill ground mount system on the capped and closed landfill
- Developing grading and access plans for site preparation for the ground-based systems. This includes preparing a storm water management plan and providing the necessary engineering design to modify the existing storm water management system
- Submitting documentation to the MassDEP that the existing cap meets the standards for an alternative cap design in accordance with the regulations.
- Providing post closure use permitting services to comply with DEP's landfill regulations found at 310 CMR 19.000. This involves working closely with the MassDEP to provide assurances that the integrity of the landfill cap will be preserved at all times
- Providing local site design services for Planning Board approval that addresses all local issues including traffic concerns, noise, dust, setbacks, building and zoning codes, etc
- Providing wetland delineation and local wetlands permitting services given that the proposed construction activities for the solar array system come within 100 feet of a jurisdictional wetlands area.
- Providing professional engineering oversight and observation during work on the landfill cap and assisting with the preparation and submittal of a final as-built plan to MassDEP once the Solar Array is completed.

In addition to our extensive command of the landfill regulations and landfill engineering design, we are very knowledgeable on regulations that apply to solar systems as well as state incentive programs such as the Massachusetts Renewable Portfolio System Carve-Out, Solar Renewable Energy Certificates (SRECs), and net-metering.

# ENGINEERING AND PERMITTING SERVICES FOR SOLAR ENERGY

Easthampton, Massachusetts



## Client

**Borrego Solar Systems, Inc.**

## Description

Borrego and Tighe & Bond were selected by the City of Easthampton to develop large-scale solar energy systems and provide energy management services to Easthampton. The City has two properties that are potentially suitable for solar installation; one at the wastewater treatment plant (WWTP) on Ferry Street and the other at the Oliver Street Landfill. The solar installations at these two sites will total over 2 Megawatts.

Tighe & Bond will provide local and state permitting services required by the project. This includes preparing Special Permits for each site, and a Major Post-Closure Use Permit and Request for Determination of Applicability to the Easthampton Conservation Commission for the landfill installation. Permitting efforts will also include wetlands delineation and filing of a Notice of Intent for the WWTP site.

Engineering services being provided include geotechnical engineering to evaluate the subgrade conditions for installation of the ballasted system; electrical engineering to determine interconnection and protection requirements; and construction phase services to monitor system installation. In addition to permitting and engineering services, Tighe & Bond will work with Borrego and the City to assess various properties in the City that may be suitable for solar installations, such as schools and other municipal buildings.

## ENGINEERING AND PERMITTING SERVICES FOR BORREGO SOLAR Lancaster, Massachusetts



### Client

**Borrego Solar/Town of Lancaster**

### Description

Tighe & Bond has partnered with Borrego Solar to provide the Town of Lancaster with a 750 KW solar array at the town's capped landfill on Lunenberg Road. The landfill was capped with a synthetic membrane in 1990 and the site has remained inactive for 20 years. In 2008, Tighe & Bond performed a post closure alternatives report for the site and examined various potential uses. The town then issued a Request for Proposals for solar developers to utilize the former landfill site for solar. Tighe & Bond teamed with Borrego and was awarded the project by the Town of Lancaster.

For this ground-based installation, Tighe & Bond is using its solid waste engineering experience to design a stable solar system on the side slopes of the landfill. This is the first side slope sunlight ground mount system proposed in the Commonwealth. Tighe & Bond has a dedicated team working on the leading edge of solar development and is providing the following solar energy-related services:

- Conducted an alternatives analysis for potential post closure uses at the landfill which recommended solar
- Evaluated the property for land availability inclusive of off and on the landfill cap



## ENGINEERING AND PERMITTING SERVICES FOR BORREGO SOLAR Lancaster, Massachusetts

- Evaluated the availability of transmission interconnections and implications for siting in both investor-owned utility and municipal electric department service areas
- Provided geotechnical and landfill engineering design services for a landfill side slope ground mount system on a capped and closed landfill slope of 3:1. Provided feasibility assessments for roof and ground-mounted systems
- Developing grading and access plans for site preparation for the ground-based systems
- Providing post closure use permitting services to comply with DEP's landfill regulations found at 310 CMR 19.000
- Providing local site design services for Planning Board approval
- Providing local wetlands permitting services due to the proposed array being within 100 feet of a jurisdictional wetlands area.

In addition to our extensive command of the landfill regulations and landfill engineering design, we are very knowledgeable on regulations that apply to solar systems as well as state incentive programs such as the Massachusetts Renewable Portfolio System Carve-Out, Solar Renewable Energy Certificates (SRECs), and net-metering.

## APPENDIX M: TRC Solutions Qualifications

## TRC COMPANY PROFILE

### CORPORATE OVERVIEW

TRC Companies, Inc. (TRC) is a national environmental consulting, engineering, and construction management firm providing integrated services to the environmental, energy, and infrastructure markets. TRC's staff of over 2,400 provides services to renewable energy developers, major industries, utilities, banks and federal, state and local government agencies from over 70 offices nationwide. Established in 1971, TRC is the first energy and environmental service firm to be listed on the New York Stock Exchange (NYSE:TRR).

TRC's talented, innovative, and dedicated professional staff is committed to enhancing our clients' reputations and positions in their respective industries. Our clients will attest that TRC staff is well regarded for solving the most challenging project assignments, on schedule and on budget.

Our multidisciplinary project teams provide turnkey support for implementing complex projects from initial planning and design through construction, operation, and post-construction maintenance and monitoring. By consistently adhering to the principles of quality, integrity, and responsiveness TRC's experienced staff provides reliable services to a broad range of clients who depend on us for customized and complete solutions to environmental and engineering challenges.



Please find additional company information, project histories, financial filings, customer testimonials, etc. on our website at [www.TRCSolutions.com](http://www.TRCSolutions.com).

## TRC COMPANY PROFILE

### TRC CLIENT COMMITMENT

TRC understands that the success of our consulting practice rests upon our ability to effectively implement the contracted services for our client. TRC will commit appropriate levels of staff and company resources for each assignment. Our capabilities in engineering and design, right-of-way acquisition and permitting, and environmental services are complemented by our in-house procedures for schedule maintenance and resource tracking.

### Comprehensive Services

- ◆ Feasibility studies and alternatives analyses
- ◆ Engineering design
- ◆ Project Management
- ◆ Project Permitting (FERC, CEQA, BLM, Licensing)
- ◆ Construction Management, documentation, and reporting
- ◆ Right-of-Way and Land Acquisition Support
- ◆ Biological and Cultural surveys and assessments
- ◆ Environmental Training and Compliance

## TRC RENEWABLE ENERGY SERVICES

Growing energy demands require new supply sources and the infrastructure to deliver them. At the same time, we face the requirement to balance environmental challenges with the need for economic growth.

It is a time of transition to a more sustainable energy future – meeting our current needs without compromising the needs of future generations.

TRC has successfully designed, evaluated and implemented programs for renewable developers, utilities and government authorities. We can leverage this experience to support our clients as they deliver highly effective and profitable renewable energy and energy efficiency programs. TRC fully recognizes the importance and the significance of carefully considering the best approaches when developing a portfolio of projects. Utility programs must meet energy savings, demand reduction, and budget goals while being cost-effective in program delivery; provide excellent service, and realize high levels of customer satisfaction. Programs must be innovative, yet streamlined. Energy developers must find the best system types and have optimum construction and implementation to maximize project profitability.

Successful development of solar energy projects requires attention and expertise in many different areas. TRC's provide the knowledge and expertise in:

- System power capacity, engineering and designs
- Industry products, options and integration
- Permitting and Environmental impacts
- Land use, variances and zoning restrictions
- Interconnection coordination and design
- Site development
- Construction services

The services TRC provides during project development are critical to identifying issues that may affect project viability or design.

TRC brings a national staff of over 2,500 experienced personnel in over 80 offices to solar development and design projects. Our *customer-focused solutions* provide efficient, cost-effective support to solar power and other energy clients.

Having all necessary disciplines available from a single point of contact and responsibility makes project development easier and less expensive than coordinating with numerous different firms.

Our customers benefit from TRC's understanding of the unique challenges associated with energy projects, and from our full-service engineering and environmental capabilities.

### REPRESENTATIVE ENERGY CLIENTS

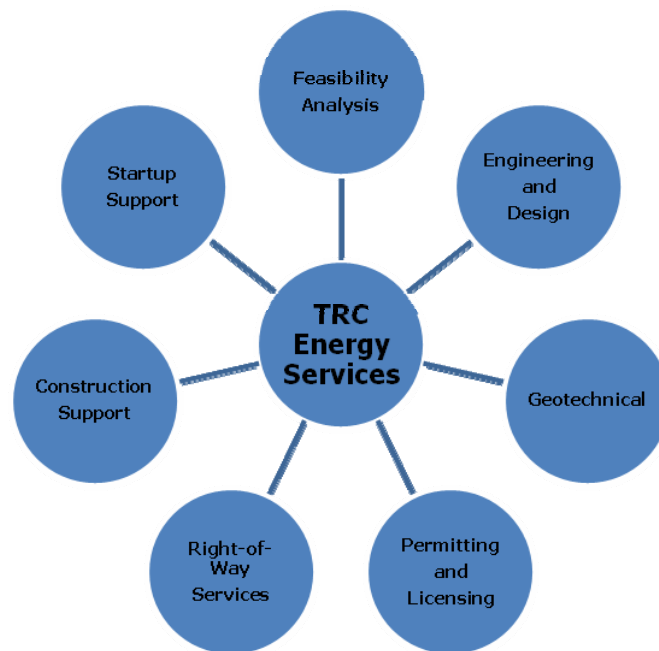
- ◆ AES Americas, Inc.
- ◆ United States Department of the Army
- ◆ United States Marine Corps
- ◆ ESI Energy
- ◆ Federal Aviation Administration (FAA)
- ◆ Johnson Controls
- ◆ Navopache Electric Cooperative
- ◆ Long Island Power Authority
- ◆ Pacific Gas & Electric
- ◆ Public Service Company of New Mexico (PNM)
- ◆ Sempra/San Diego Gas and Electric (SDG&E)

# TRC RENEWABLE ENERGY SERVICES

## TRC PROFESSIONAL SERVICES

### Project Management

TRC focuses on providing our customers with a single source solution for all of their energy projects. TRC Project Managers understand their roles as consultants and the importance of maintaining schedules and budgets to ensure project success. We assess requirements for fulfilling each assignment individually and apply staff and resources which are appropriate to ensure successful contract performance. We promise to deliver quality work products on-schedule, and within our established budgets.



# TRC RENEWABLE ENERGY SERVICES

## Engineering and Design Services

The TRC Engineering and Design Group provides a full range of engineering services to the Energy Industry. With engineering and design professionals across the country, TRC is ready to provide its expertise to assist companies in successfully completing their energy projects. TRC and its staff of professionals have a proven record of engineering and designing renewable energy facilities, including wind and solar as well as high voltage installations throughout the United States.

TRC's Engineering and Design services include:

- GIS mapping
  - Identifying site boundaries from commercially-available data
  - Calculating approximate acreage
- Site reconnaissance
  - Ascertaining buildable areas
  - Determining constructability
  - Identifying interconnection points
  - Determining accessibility issues and physical constraints
- Evaluation of available technology
  - Wind energy
  - Solar energy
  - Renewable energy
- System evaluations
  - Site layout
  - Estimate electrical generating capacity
  - Interconnection requirements
- Desktop environmental evaluations (if necessary)
- Land surveys
  - Identifying the surveyed boundaries of the parcel(s)
  - Capturing above- and below-ground physical features of the site
- Detailed site plan development
- Panel and equipment selection
- Single-line diagrams
- Power curves and system production models
- Production of Construction Drawings and Specifications
- Material Specification and Procurement
- Solicitation of construction costs
- Contractor evaluation and selection
- Construction management
- Construction support
- Commissioning support



# TRC RENEWABLE ENERGY SERVICES

## Environmental Resources Services

### NEPA/CEQA

TRC has assembled a nationally recognized team to assist clients in preparing professional, timely, and accurate environmental documents including Environmental Assessments (EAs), Environmental Impact Statements (EISs), Initial Studies, Mitigated Negative Declarations (MNDs), and Environmental Impact Reports (EIRs). We have prepared numerous NEPA and CEQA documents for pipeline and power line companies; telecommunication systems; oil, gas and water development projects; road construction projects; and renewable energy projects including solar power and wind power. We offer the following services:

- Baseline studies for physical and biological resources, cultural resources, socio-economics, land use, aesthetics, and infrastructure
- Scoping including public involvement, meetings, and agency consultation
- Mitigation planning including reclamation plans, historic/archaeological protection plans, wildlife management plans, and monitoring
- Environmental document preparation
- Compliance and construction monitoring

### Environmental Permitting

TRC's Environmental Permitting team continues to guide clients through the many environmental regulations that are designed to protect air, water, soil, wetlands, and biological resources.

- Ecological services: wetland permits and delineations, vegetation studies, threatened and endangered species studies, and wildlife surveys
- Physical resources services: noise, air and water quality, waste management, and waste characterization
- Reclamation services: baseline studies, reclamation and mitigation planning, revegetation monitoring, and liability release

TRC staff have developed quality working relationships with local, state, and federal agencies including, but not limited to, the US Army Corps of Engineers, US Fish and Wildlife Service, California Department of Fish and Game, Regional Water Quality Control Boards, and State Water Resources Control Board.

## Cultural Resources Services

TRC is one of the largest cultural resources management firms in the country and offers a full range of cultural resources services, including archival, archaeological, paleontological, ethnographic, and architectural research investigations. Our Cultural Resources Management

## TRC RENEWABLE ENERGY SERVICES

team works with large governmental and commercial clients to identify cultural resources, to evaluate their significance based on local, state, and federal regulations, to design cost-effective and legally defensible mitigation plans for their recordation, preservation, and/or avoidance based on their level of significance, and to ensure compliance with local, state, and federal regulations governing the project.

Our cultural resources staff is located in our Albuquerque, Atlanta, Austin, Irvine, El Paso, Laramie, Nashville, and Durham offices with the ability to mobilize quickly and effectively and is prepared to work nationwide. Recent projects have been conducted from California to New Jersey and from Georgia to Wyoming. Our staff also includes experts in historic preservation planning, mapping, laboratory analyses, artifact curation, exhibit planning, and popular interpretation. The most advanced mapping and analytical tools are regularly used by TRC to enhance graphical interpretation and visualization including GPS, Digital Total Station, CAD, and GIS. We offer the following cultural resources services:

- Management services including compliance planning, National Register of Historic Places (NRHP) evaluations, research designs, testing and data recovery plans, and historic preservation plans;
- Archival research including records searches and literature reviews of previously recorded cultural resources, previous vicinity studies/investigations, early period historic plat maps, National Register of Historic Places listings, Government Land Office Patent Records of historic properties and transactions, Native American Heritage Commission Sacred Lands searches, and Sanborn maps if available;
- Field Studies including archaeological surveys, archaeological excavations, site testing and evaluation investigations, mitigation plans, and Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation;
- Laboratory studies including ceramic analysis, faunal analysis, lithic analysis, and pollen and macrobotanical sample analyses; and
- Native American consultations: TRC has 1) permits with the BLM/USFS throughout the Southwest to conduct cultural surveys and excavations, and 2) enduring relationships with Native American Tribes and State Historic Preservation Officers (SHPOs).

### Right-of-Way Services

TRC Right of Way ("TRC ROW") department provides full service, nationwide right of way services to the pipeline, power transmission and distribution, and telecommunications industries. TRC ROW's expert staff offers a wealth of experience across the entire spectrum of right of way disciplines and geographic locales. With over 200 highly experienced Right of Way Professionals available to staff projects, TRC is in a unique position to provide unparalleled expertise to support projects across the U.S.

## TRC RENEWABLE ENERGY SERVICES

TRC ROW interacts seamlessly with TRC's Engineering and Design Group to provide a sole-source, turnkey project. Utilizing in-house experts in environmental, engineering/design, survey, right of way acquisition, procurement, project management, and construction management, TRC staff can provide unsurpassed excellence in service.

TRC ROW provides a wide range of Right-of-Way Services including:

- Landowner Research and Valuation
- Survey Permission
- Fee Acquisition
- Encroachment Permitting
- Construction Support
- Line List Preparation
- Easement Acquisition
- Franchise Acquisition
- Railroad Licensing
- Budget and Schedule Management

### Land Surveying Services

- Boundary Surveying and Mapping
- Geodetic Control Surveying
- Right of Way Surveying and Mapping
- Topographic Surveying and Mapping
- Cadastral Surveying and Mapping
- ALTA/ACSM Land Title Surveys
- Legal Descriptions and Exhibits
- FEMA Elevation Certification
- Construction Staking
- Construction As-Built Surveying
- Construction Verification Surveying
- Land Survey Project Management
- High Definition Laser Scanning Surveys
- Engineering Design Support

## TRC REPRESENTATIVE EXPERIENCE

### NATIONAL GUARD FACILITIES, NEVADA

TRC provided design and integration of three National Guard Facilities in Nevada. Parking areas were retrofitted with car ports to generate electricity for the site and provide shade for the cars during the hot summer days. TRC's scope of work included careful coordination with the proposed panel layout, integration with the existing electrical systems in the buildings, civil design drawings, electrical design drawings, structural design drawings, permitting package and bid package.

### CARRIER CLINIC, NEW JERSEY

TRC provided permitting, site layout, engineering and design to install a ground mounted system in New Jersey. The permitting included appearance at various Board meeting, presenting the project, and responding to technical questions regarding the project. The engineering and design included integration of the solar field with the existing electrical system along with the utilities required for the field. TRC provided engineering support during construction. The facility is scheduled for commissioning early next year

### LIPA 20 MW SOLAR PV PROJECT, NASSAU AND SUFFOLK COUNTIES, NY

Challenged by New York's 45 by 15 program to achieve 45% of the State's electricity demand through renewable sources and energy efficiency by 2015, the Long Island Power Authority (LIPA) recently selected enXco to supply up to 20MW of renewable energy from solar photovoltaic installations constructed and operated on existing commercial, government, industrial and institutional properties across LIPA's service territory.



Under the terms of a proposed 20-year Solar Capacity and Energy Power Purchase and Sale Agreement (PPA) enXco will develop, own and operate distributed solar photovoltaic (PV) electric generating systems mounted on existing building roofs, as well as parking garages and lots, connected to LIPA's distribution grid via an Interconnection Agreement (IA) and deliver up to 20MW of power, which is enough to

meet the needs of more than 2600 households and reduce regional greenhouse gas emissions by 8,000 tons per year.

Needing to *fast-track* the development phase of its Solar PV Project selection by LIPA, enXco engaged TRC to provide various tasks in support of the project's development program including: siting assistance; environmental, building and zoning code reviews;

## TRC REPRESENTATIVE EXPERIENCE

land development permitting; and electrical interconnection assessment and design services. To-date, TRC has:

- Assisted *enXco* and LIPA with environmental, zoning and building codes, and interconnections, due diligence for over sixty (60) candidate development sites located throughout Nassau and Suffolk counties;
- Managed the Project's comprehensive environmental review under New York State's Environmental Quality Review Act (SEQRA); and
- Managed the Project's initial outreach to involved elected and appointed officials and local jurisdictional agencies.

### **1.8MW Photovoltaic Installation, Hillsborough, NJ**

TRC was the lead for a study of existing facility for PV interconnection and system sizing. TRC's engineering team was the lead in the design of PV array, site improvements, building interconnection, land use variances, plan reviews and purchasing. System included 13 acres of thin film panels on above-ground racking structures. TRC assisted the developer in establishing design and project standards for future ground-mounted PV installations.

### **Photovoltaic Development Plan, (3) sites, California Desert**

TRC was the lead multi discipline engineering team and environmental consultant in the development of Plan of Development submittals to Bureau of Land Management. TRC surveyed, documented and developed preliminary design for three sites as well as managed the development of hydronic study for storm water management. Included in the study were two sites at 1,000 acres each and a third at 2,000 acres. An above ground thin film PV planned to yield 100MW and 200MW per site respectively.

### **Marine Training Base, Combined Energy Project, Twenty-Nine Palms, CA**

TRC provided project review and consulting and developed acceptance testing and commissioning plans for the following systems: Mechanical, Electrical, EMCS, Plumbing & Fire Protection for 9MVA (12kV) Turbine Cogeneration Plant.

TABLE 1. CROSS SECTION OF CURRENT TRC ENERGY PROJECT ASSIGNMENTS					
Region	Electric Generation		Transaction Due Diligence	Natural Gas Transmission/LNG	Electric Transmission
	Fossil Plants	Wind Power/ Renewable Energy			
Mid-Atlantic/ Northeast	Astoria Energy Calthness Energy Calpine Connecticut Municipal Electric Energy Cooperative (CMEEC) CPV Dominion Exelon First Light FPL Energy GE GenPower LS Power Mirant NRG Energy PPL PSEG Fossil SCS Energy	AES Acciona Energy Brookfield Power FirstWind Horizon Wind Oceana Energy Minerals Management Service Wheelabrator	Dominion LS Power Morgan Stanley Sempra	Competitive Power Ventures (CPV) Quoddy Bay LNG Spectra Energy Algonquin Gas Transmission Islander East Maritimes & Northeast Pipeline Northeast Gateway Tennessee Gas Pipeline Texas Eastern Transmission	Allegheny Power Central Hudson Central Maine Power Co ConEdison ISO NE National Grid NYISO Northeast Utilities Orange & Rockland Rochester Gas & Electric Velco
Southeast	AEP Calpine Dominion		LS Power	Florida Gas Transmission Spectra Energy	FPL Georgia Transmission Progress Energy
Gulf	Calpine Dynegy	Babcock & Brown DKRW Wheelabrator	LS Power Kelson Energy	CenterPoint Energy Cheniere LNG ExxonMobile Foothills Energy Freeport LNG Gulf LNG Midcontinent Express Occidental Panhandle Energy Sempra LNG Southeast Supply Header Southern Union Trunkline LNG	Entergy
Midwest	AEP Calpine Louisville Gas & Electric Otter Tail Power	Iberdrola	LS Power	Kinder Morgan Midwest Gas Transmission	AEP CPV
Central/ Rocky Mountains	Calpine Great Northern Power Development (GNPD)	BP Alternative Energy	JP Morgan Chase LS Power	Kinder Morgan	
West	Aurora Energy Avenal Energy Calpine J Power PPL	Oceana Energy	LS Power	Kern River Pipeline Questar Transwestern Pipeline	PGE Sempra Energy



## Power Delivery Engineering



*TRC Power Delivery Engineering staff have supported the development of more than 3,000 miles of distribution and transmission lines, and have supported the engineering, design and construction of over 200 substations and switchstations.*

TRC Power Delivery Engineering provides complete engineering consulting for utilities, municipalities, and industries. Investment in electric transmission and distribution infrastructure represents one of the largest financial commitments facing utilities over the upcoming decade. The age of the transmission and distribution network and continuing electric load growth have resulted in heightened concern on the reliability of the nation's grid.

We have grown to be one of the leading engineering and environmental licensing service providers supporting the extensive upgrade underway to the nation's electric grid system. Through our nationally based power delivery engineering group, services are provided in the areas of engineering design, material procurement, and

construction management. We are also providing essential operations and management support to utilities as the trend towards outsourcing engineering functions continues.

Many clients have preferred EPC (Engineer, Procure, Construct) contracts in recent years and TRC has delivered this full service successfully to clients across the United States. Our clients include companies for whom we have completed large and complex projects – including Northeast Utilities, National Grid, Central Maine Power and Mitsubishi Electric Power Products. Our ability to provide integrated engineering and environmental services has proven to be a key factor in the successful completion of complex utility engineering & construction projects.



## Representative Clients

- ABB, Inc
- AES Corporation
- Alabama Power Company
- Alliant Energy
- Alstom
- American Electric Power
- Bangor Hydro Electric Co.
- Calpine
- Central Maine Power Co.
- Central New Mexico Electric Coop.
- Central Vermont Public Service
- Consolidated Edison of New York
- Detroit Edison Company
- Duke Energy
- Eastern Maine Electric Coop.
- FPL Energy Main Hydro
- Georgia Pacific Corporation
- Georgia Power Company
- Global Power Systems
- Lubbock Power & Light
- Lyntegar Electric Coop.
- Maine Natural Gas
- Mitsubishi Heavy Industries America, Inc.
- National Grid USA
- New York Power Authority
- Northeast Utilities
- NRG North America
- NSTAR/Boston Edison Company
- Ohio Edison
- Pacific Gas & Electric Co.
- PacifiCorp
- Peabody Energy
- Pennsylvania Power
- PPL Global
- Public Service Company of New Mexico
- San Diego Gas and Electric
- Shell Wind Energy
- Sierra Pacific Power Company
- Sithe Energies, Inc.
- South Carolina Electric and Gas
- South Plains Electric Coop.
- Southeastern Michigan REC
- Southern Company
- Southwestern Public Service Co.
- Tenaska Energy
- TransÉnergie US Ltd.
- US Department of Energy
- Vermont Electric Coop.
- Western Area Power Administration
- Xcel Energy



*For the Maguire Road Project, TRC provided engineering, licensing, procurement, construction management, and commissioning services to Central Maine Power Company under the terms of an EPC Contract.*



*TRC's work for Orange & Rockland Utilities (ORU) included reconductoring existing 69 kV transmission lines to meet new electrical capacity requirements.*



*For Connecticut Light & Power, TRC is providing engineering, procurement, and construction services for modification to the Barbour Hill Substation.*



*For the Wakefield Junction Substation Project, TRC is providing engineering, procurement and construction services to Mitsubishi Electric Power Products, Inc. for a new 345/115 kV GIS under the terms of an EPC contract.*

### About TRC

A pioneer in groundbreaking scientific and engineering developments since the 1960s, TRC is a national engineering, consulting, and construction management firm providing integrated services to the energy, environmental and infrastructure markets. We serve a broad range of clients in government and industry, implementing complex projects from initial concept to delivery and operation.

A publicly-held corporation listed on the New York Stock Exchange (NYSE:TRR) – NYSE's oldest environmental firm – TRC includes 2,300 technical professionals and support personnel in more than 70 offices throughout the U.S. Our clients depend on TRC's multidisciplinary teams to design solutions to their toughest business challenges.

Comprised of many experienced engineers, our project teams plan, design and install facilities that meet client's financial, technical, and scheduling goals and deliver completed facilities, from transmission lines, to switchyards to integrated/automated substations. Our power delivery goals are to make the client's job easier, be an extension of the client's staff, provide flexibility, and deliver a quality product.

*For more information, please contact:  
Jim Mayer, Energy Sector Leader  
207.621.7000 [jmayer@trcsolutions.com](mailto:jmayer@trcsolutions.com)*



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TRC  
SUPERFUND SITE EXPERIENCE

Superfund Site		Client	Location		Oversight/ Risk Assessment/ Permits	Misc Consulting	Preliminary Site Assessment	Remedial Investigation	Feasibility Study	Remedial Design	Construction Phase	Site Management Services
Advanced Laboratories		U.S. EPA/Region I, Boston, MA			X							
Albert Steel Drum/Prentiss Drug		State of NJ Department Environmental Protection & Energy, Trenton, NJ	Newark, NJ				X					
ALCOA		U.S. EPA/Region II, NY, NY	Massena, NY		X		X	X	X			
Anchor Chemical		U.S. EPA/Region II, NY, NY	Hicksville, NY		X							
Atchison, Topeka and Santa Fe Railway (AT&SF)			Albuquerque, NM				X	X	X	X		
Atlantic City International Airport		U.S. Department of Transportation, FAA, Atlantic City, NJ	Atlantic City, NJ		X		X	X	X	X	X	X
Auburn Road Landfill		U.S. EPA, Washington, DC			X							
Baird McGuire		MA Department of Public Health, Boston, MA	MA		X			X				
Baldwin Park Operable Unit Ground Water		Confidential, Los Angeles, CA	CA		X		X	X	X	X		
Bayou Bonfuca		IT/OHM, Metairie, LA	Metairie, LA		X		X	X	X			
Bayou Bonfuca		Hoffman, Sutterfield, Ersenat & Bankston, New Orleans, LA	Slidell, LA		X		X	X	X			
Beacon Heights Landfill		Engineering Management, Inc., Pittsburgh, PA	Beacon Falls, CT		X				X	X		X
Beazer Site		Beazer East, Inc., Pittsburgh, PA	Gainesville, FL					X	X	X		X
Bennington Landfill		U.S. EPA/Region I, Boston, MA	Bennington, VT		X		X	X	X			X
BNSF's Dismantled Tie Treating Plant -		Burlington Northern & Santa Fe Railway Co. (BNSF), Fort Worth, TX	Albuquerque, NM				X	X	X			
Broderick Wood Products		Union Pacific Railroad Company	Denver, CO					X	X	X	X	
Brookhaven National Laboratory		U.S. EPA/Region II, NY, NY	Upton, NY		X		X	X	X			
Cabot Carbon/Koppers			Gainesville, FL		X		X	X	X	X		
Carroll and Dubies		U.S. EPA/Region II, NY, NY	Deer Park, NY		X		X	X	X	X		
Central Chemical		Latham & Watkins, LLP, Washington, DC	Texas		X				X			
Charles George Landfill		U.S. EPA/Region I, Boston, MA	Tyngsboro, MA		X					X	X	X
CIBA		CIBA Specialty Chemicals, Toms River, NJ	Middlesex County, NJ				X	X				
CIBA McIntosh		OHM Remediation Service, Corp., Palos Heights, IL	McIntosh, Alabama		X				X			
Cleve Reber Superfund Site		OHM, Findlay, OH	Sorrento, LA		X				X			
CONFIDENTIAL, Litigation Support, Analysis of Liability Claims		Hattis Beach & Wilcox, Dochester, NY	Gloversville and Johnstown, NY		X							
Darling Hill Dump		U.S. EPA/Region I, Boston, MA	Lyndon, VT		X		X	X	X			
Delaware Sand and Gravel		URS Consultants, Buffalo, NY	DE						X			
Dover Municipal Landfill		U.S. EPA/Region I, Boston, MA	Dover, NH		X		X	X	X			
DuPont Necco Park		U.S. EPA/Region II, NY, NY	Niagara Falls, NY		X		X	X				
Evor Phillips Leasing Company		State of NJ Department Environmental Protection & Energy, Trenton, NJ	NJ				X	X	X			

TRC  
SUPERFUND SITE EXPERIENCE

Superfund Site		Client	Location		Oversight/ Risk Assessment/ Permits	Misc Consulting Preliminary Site Assessment	Remedial Investigation	Feasibility Study	Remedial Design	Construction Phase	Site Management Services
Ewan Drum		U.S. EPA/Region II, New Yourk, NY			X				X		
Fields Brook		Confidential Client	Ashtabula, OH		X						
Fort Devens		MA DEP, Boston, MA	Ayer, MA				X	X	X	X	
GBF Landfill			Antioch, CA		X		X	X	X		
Harbor Island		Lockheed Martin Corporation, Littleton, CO	Seattle, WA				X	X	X	X	
Hatheway & Patterson		U.S. EPA/Region I, Boston, MA	Mansfield, MA		X	X					
Jones Sanitation Site		U.S. EPA/Region II, NY, NY	Hyde Park, NY		X		X	X			
Koppers		Koppers Industries, Inc., Sonerville, TX	Charleston, SC		X	X	X	X	X	X	
LCP Chemicals		Geosyntec Consultants, Inc, Atlanta, GA	GA		X						
Linemaster Switch		U.S. EPA/Region I, Boston, MA			X						
Lower Passaic River (Diamond Alkali)			Newark, NJ		X						
Mace Ranch Park Residential Development		Ramco Enterprises, Inc., West Sacramento, CA	Davis, CA		X						
Madawaska		U.S. EPA/Region I, Boston, MA	Van Buren		X						
Malta Rocket Fuel Area		U.S. EPA/Region II, NY, NY	Malta, NY		X		X	X			
Mattiace Petrochemical			Glen Cove, NY					X	X	X	X
McColl		Morrison Knudsen Corporation, Boise, ID	Fullerton, CA		X		X	X	X		
MDI		Halliburton, Houston, TX	Houston, TX		X		X				
Mottolo		U.S. EPA/Region I, Boston, MA			X						
Myers Drum Reconditioning Facility		Myers Container, Emeryville, CA	Emeryville, CA		X	X	X	X	X	X	X
Naval Sub Base-New London		U.S. EPA/Region I, Boston, MA	Groton, CT								
New Bedford Harbor		Foster Wheeler Environmental Corporation, Boston, MA	New Bedford, MA				X				
Newport Base, RI		U.S. Department of the Navy	Newport, RI		X	X	X	X	X		
NH Plating		U.S. EPA/Region I, Boston, MA	NH		X		X	X			
Niagara Mohawk Power Corporation		U.S. EPA/Region II, NY, NY	Saratoga Springs, NY		X		X	X			
North Kansas City/Armour Road		Burlington Northern & Santa Fe Railway Co.	Kansas City, MO		X		X				
Nyanza Chemical		U.S. EPA/Region I, Boston, MA	MA		X						
Operating Industries, Inc. Landfill		Foster Wheeler Environmental Corporation/New Cure Inc., Monterey Park, CA	Monterey Park, CA				X			X	
Otis Air Force Base		U.S. EPA/Region I, Boston, MA	Sandwich, MA		X	X	X	X	X		
Parker Landfill		U.S. EPA/Region I, Boston, MA	Lyndon, VT		X	X	X	X	X	X	X
Passaic Asbestos Dump		U.S. EPA/Region II, NY, NY	Passaic, NJ		X	X	X	X	X	X	X
Pease Air Force Base		U.S. EPA/Region I, Boston, MA	Newington, NH		X	X	X	X	X		
Peterson Puritan		U.S. EPA/Region I, Boston, MA	MA		X						
Picillo Farm		Gradient Corporation, Cambridge, MA	Coventry, RI		X						

TRC  
SUPERFUND SITE EXPERIENCE

Superfund Site	Client	Location	Oversight/ Risk Assessment/ Permits	Misc Consulting	Preliminary Site Assessment	Remedial Investigation	Feasibility Study	Remedial Design	Construction Phase Services	Site Management Services
Plywood Ranch	U.S. EPA/Region I, Boston, MA		X							
Pownal Tannery	U.S. EPA/Region I, Boston, MA	Pownal, VT			X	X	X	X	X	X
Purity Oil Sales	Purity Oil Sales Site Respondents, Los Angeles, CA	Fresno County, CA	X			X	X	X	X	
Raybestos Memorial Field	U.S. EPA/Region I, Boston, MA		X				X			
Revere Textile Prints Corporation	U.S. EPA/Region I, Boston, MA	Revere, CT	X		X	X	X	X	X	X
Rose Hill Landfill	U.S. EPA/Region I, Boston, MA	South Kingstown, RI	X							
Rowe Industries	U.S. EPA/Region II, NY, NY	South Hampton, NY	X		X	X	X			
San Fernando Valley	Lockheed Martin Corporation, Littleton, CO	CA	X				X	X	X	
Santa Fe Lake	Burlington Northern & Santa Fe Railway Co.	Clovis, NM	X				X			
Sante Fe Springs		Santa Fe Springs, CA	X				X	X		
Shpack Landfill		Attleboro, MA	X		X					
Silresim	U.S. EPA/Region I, Boston, MA	Lowell, MA								
Solvent Chemical	Stoss, Inc., Cambridge, MA									
	ALG Environmental Management, Inc., Philadelphia, PA	Niagara Falls, NY			X	X	X	X	X	X
South Municipal Water Supply Well Superfund Site	U.S. EPA/Region I, Boston, MA	Peterborough, NH	X					X	X	
Stamina Mills	U.S. EPA/Region I, Boston, MA		X							
Sullivan's Ledge O.U. II	U.S. EPA/Region I, Boston, MA		X							
Tansitor	U.S. EPA/Region I, Boston, MA	Bennington, VT	X		X	X	X	X		
Texaco Sunburst	Texaco Refining & Marketing, Burbank, CA	Sunburst, MO			X	X	X			
Thea Foss Estuary	Confidential Client, ,	Tacoma, WA	X		X	X	X			
Tibbetts Road	U.S. EPA/Region I, Boston, MA	MA	X							
U.S. Navy Construction Battalion Center (CBC)	U.S. Navy, Northern Division, Philadelphia, PA	Davisville, RI			X	X	X	X		
Wallkill Wellfield	U.S. EPA/Region II, NY, NY	Middletown, NY	X		X	X	X	X	X	
Waste Disposal, Inc. (WDI)	WDI Group, Fullerton, CA	Santa Fe Springs, CA								
Wells G&H	U.S. EPA/Region I, Boston, MA	Woburn, MA	X		X	X	X	X	X	X
William J. Hughes Technical Center	Federal Aviation Administration	Atlantic City, NJ	X		X	X	X	X	X	X
Wilson Farm	U.S. EPA/Region II, NY, NY	Plumsted Township, NJ	X							
Woodbrook Road	Texas Eastern Terminal Company, Houston, TX, AIG Technical Services, Inc., Jersey City, NJ	South Plainfield, NJ	X		X	X	X	X	X	X
Xold Springfield Landfill	U.S. EPA/Region I, Boston, MA	MA	X							





## STATEMENT OF QUALIFICATIONS



**SOLAR POWER**



# About TRC



TRC has a long history of excellence in the energy industry, including permitting and engineering for a wide variety of renewable energy technologies such as solar, wind, and hydro. TRC also has extensive experience in civil and electrical engineering as well as power delivery and construction oversight. From a network of 73 offices, our interdisciplinary staff of over 2,500 scientists and engineers provide project support and management in all stages of energy project development, construction, and operation.

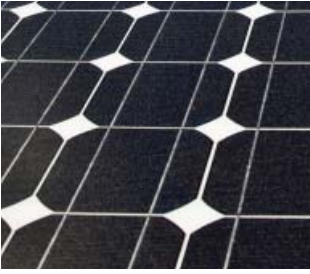
TRC offers a complete portfolio of energy services to assess your specific situation and develop opportunities for improvement. We can help you reduce your energy costs, secure your energy supply and create a sustainable energy program. We have provided energy services and advice to our clients for over four decades, and our multidisciplinary teams can support you with our proven experience in energy assessments, asset management of energy infrastructure as well as the development of renewable energy solutions.

Serving the public and private sector with solar and renewable energy design and development, TRC offers our long-term working relationships with utilities, developers, and municipalities/counties to build solar projects that maximize profits and have minimal impact to the environment.

Our engineers and scientist have been at the forefront as the U.S. responds to changes resulting from the nation's transition in government policies toward renewable energy development, end user energy management, and environmental protection. We are proud of our past and we are dedicated to supporting the energy industry to meets the needs of a growing nation.



# TRC's Solar Energy Program



TRC provides professional services for utility-scale solar photovoltaic projects (> 1 MW). TRC works with developers, utilities, and government agencies to support both utilities and private sector clients on solar projects. We provide candidate site environmental and technical screening and assessment; project engineering; permitting; procurement; construction; and startup testing and commissioning services for Renewable Energy – Utility Scale Solar Generating Facilities (SGF). TRC ensures full compliance with federal, state, and local designs and a seamless transition through all phases of a project from conception to closeout. Our services include:

## **SITE SELECTION & EVALUATION**

- Project Feasibility Studies
- Power System Studies
- Plant Site Evaluations
- Technology Evaluation
- Preliminary Plant Design
- Cost/Benefit Analysis

## **ENVIRONMENTAL IMPACT**

- Environmental Impact Studies
- Meteorological Studies
- Permitting and Licensing
- Cultural & Natural Resources

## **ENGINEERING**

- Conceptual Plant Design
- Plant Cost Estimates
- Performance Predictions
- System Modeling
- Detailed Plant & Collection System Design
- Grid Interconnect

## **PROCUREMENT & CONTRACT MANAGEMENT**

- Specification Preparation
- Procurement Services

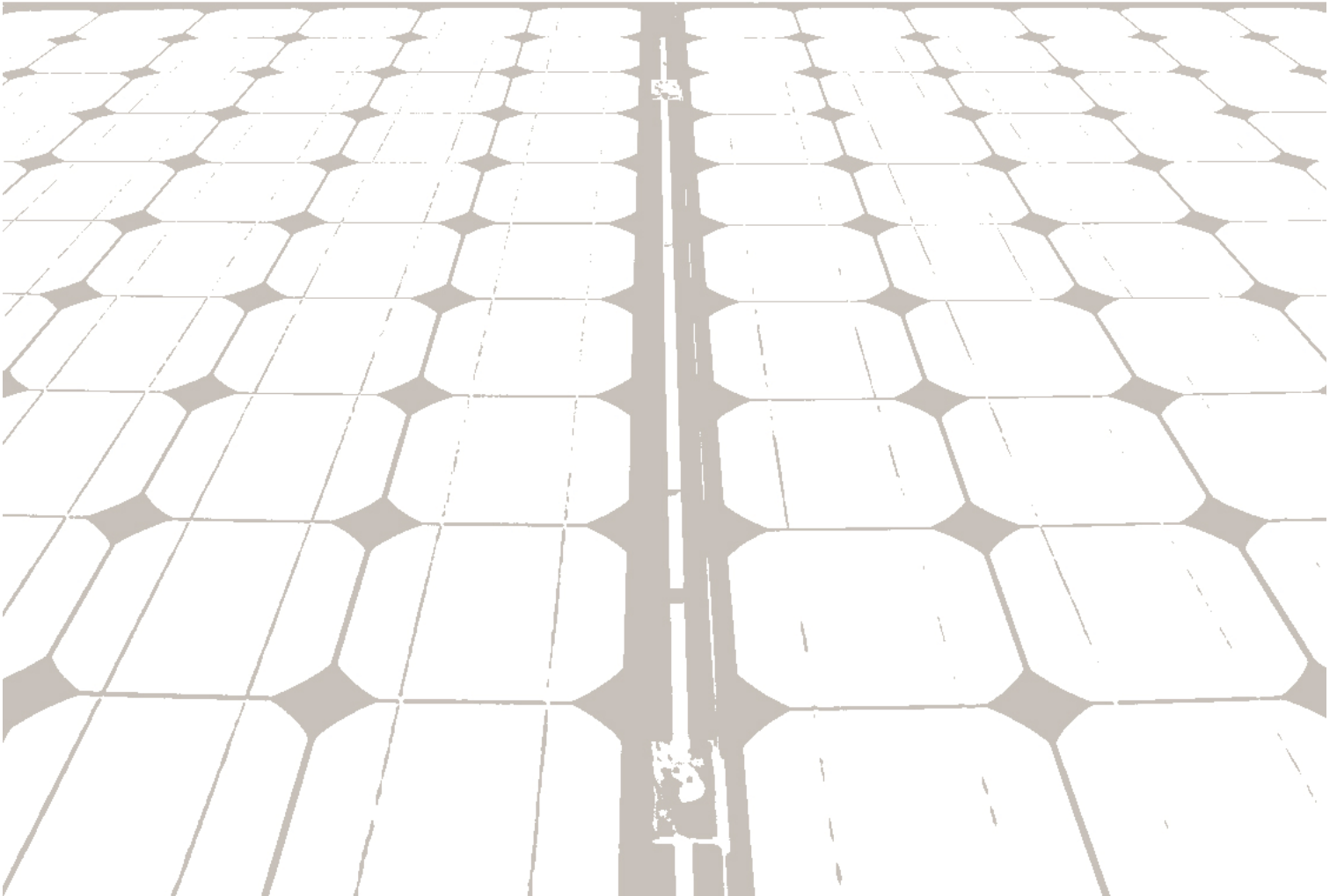
## **CONSTRUCTION**

- Construction Management/Oversight
- Compliance

## **COMMISSIONING AND TESTING**

- Performance Testing
- Integrated System Testing
- Final Site Acceptance Criteria
- Performance Monitoring

The following projects highlight  
our key capabilities.



# enXco — Eastern Long Island Solar Project



### Project Challenges

Challenged by New York's 45 by 15 program to achieve 45 percent of the State's electricity demand through renewable sources and energy efficiency by 2015, the Long Island Power Authority (LIPA) recently selected enXco to construct and operate 60,000 solar power modules, covering 46 acres of surface area at seven existing parking lots owned by Suffolk County. The solar parking canopies will provide electricity which will be delivered to LIPA through a power purchase agreement. Needing to fast-track the development phase of this project, enXco engaged TRC to provide various support services including: siting assistance; environmental, building and zoning code reviews; land development permitting; and electrical interconnection assessment and design services.

### TRC Solutions:

To-date, TRC has assisted enXco and LIPA with environmental, zoning and building codes, as well as interconnections and due diligence for over 60 candidate development sites located throughout Suffolk county. TRC has also managed the Project's comprehensive environmental review under New York State's Environmental Quality Review Act (SEQRA) and managed the Project's initial outreach to stakeholders including elected and appointed officials and local jurisdictional agencies.

### Benefits:

When completed, the project will deliver 17 MW of power, which is enough to meet the needs of 1,800 households and reduce greenhouse gas emissions by 14,000 metric tons.

**Project Location:**  
Suffolk County,  
New York

**Completion Date:**  
May 2011

#### *Photo Captions:*

*(Top) Photosimulation of the Solar Parking Canopy at the Ronkonkoma LIRR Station in the Town of Islip, New York*

*(Middle) Photosimulation of the Solar Parking Canopy at the Riverhead County Center Complex in the Town of Southampton, New York*

*(Bottom) Aerial View of the Solar Parking Canopy at the Riverhead County Center Complex in the Town of Southampton, New York*



# AxioPower Solar Farm – Permit and Design



### Project Challenges

TRC supported AxioPower (Axio) in the design and permitting of a 2 MW (DC) passive solar installation in Greenfield, MA. In June 2010, Axio was notified that it was the successful bidder to lease the Town of Greenfield's closed 25-acre landfill as a site for a 16,500 panel photovoltaic (PV) installation. Titled the Greenfield Solar Farm, Axio had proposed an aggressive schedule to have the farm generating renewable power for the Town by February 2011.

To meet that schedule, Axio had to obtain a Landfill Post-Closure Use Permit from the Massachusetts Department of Environmental Protection (MassDEP) in August 2010. While the concept of placing PV on landfills has been considered for several years, the Greenfield project was the first to actually prepare an application for a permit. Axio asked TRC to assist them obtain the permit. We had to quickly develop practical, cost-effective PV design details, installation specifications, and procedures to safeguard the integrity of the landfill cap acceptable to MassDEP without the benefit of "standards of practice."

The application was submitted to the MassDEP for review on July 9, 2010, and Axio received notification of approval on August 13, 2010. There were no substitutive comments by MassDEP.

### TRC Solutions:

- To meet the aggressive schedule, TRC mobilized a nation-wide project team with experience in PV site and electrical design, MassDEP permitting, and landfill closure design.
- TRC developed concepts for the PV installation on a closed landfill that fully met MassDEP's concerns and Axio's cost and installation schedule requirements.

### Benefits:

Axio obtained the first Landfill Post-Closure Use Permit issued by MassDEP for a PV system and is on target met their schedule. In addition, TRC engineers and scientists helped shape the technical approach for future PV installations on closed landfills.

**Project Location:**  
Greenfield, MA

**Completion Date:**  
August 2010

*Photo Captions:*  
(Top) Greenfield Landfill  
(Middle) Solar Array Plan  
(Bottom) PV Installation Rendering

# 5 MW Solar Project Northeast US



### Project Challenges:

TRC is leading the permitting efforts for one of the first solar facilities in this state. Our client will construct, own, and operate a 5-megawatt photovoltaic facility on an approximately 162-acre site.

### TRC Solutions:

- Performed the required environmental investigations, including Phase Environmental Site Assessment (ESA), wetlands delineation and Cultural Resources Phase IA/IB surveys.
- Prepared the application submittals for the following permits:
  - Letter of Interpretation (LOI) for Wetlands Delineation
  - Land Use Permits (Freshwater Wetlands General Permit and Waterfront Development Permits)
  - State Historic Preservation Office (SHPO) Phase IA/IB Cultural Resources Survey Report
  - Township Planning Boards Preliminary/Final Land Development Approval
  - County Planning Boards Preliminary/Final Land Development Approval
  - County Soil Conservation District Soil Erosion and Sediment Control Plan
- Coordinated and consulted with the respective agencies to ensure timely receipt of permit approvals.

### Benefits:

- The client's project was successfully navigated through the state and local processes, and construction is set to begin in March 2010.

#### Project Location:

Northeast US

#### Contract Award:

Confidential

#### Completion Date:

Permitting – 2/2010

COD – 6/2010

# eSolar and NRG Energy New Mexico SunTower Project



**Project Location:**  
*Santa Teresa, NM*

**Contract Award:**  
*\$150,000*

**Completion Date:**  
*April 2011*

## Project Challenges

This complex project included permitting for an approximately 450-acre 96 MW solar generation facility near Santa Teresa, New Mexico. This project was designed to assist the utilities in New Mexico achieve their targets for renewable energy, and at the same time to provide reliable power in the rapidly growing Las Cruces, NM/El Paso, TX area. TRC's role included permitting services for the new facility. The project had an aggressive schedule as well as extensive permitting, sequencing, and regulatory challenges.

## TRC Solutions:

TRC provided a full range of permitting services, including:

- Baseline cultural resources surveys and assistance with Section 106 clearance;
- Baseline biological surveys and assistance with consultation with both the US Fish and Wildlife Service and the New Mexico Department of Game and Fish;
- Assistance with traffic permitting and planning under Dona Anna County Ordinance 236-08;
- Air emissions permitting and emission calculations under AP-42 methodologies and a demonstration on a Potential-To-Emit basis;
- Groundwater quality sampling;
- Storm water pond permitting; and
- Evaporation pond permitting.

## Benefits:

The project is currently on schedule to be constructed with interconnection no later than April 2011.



# enXco, an Affiliate of EDF Energies Nouvelle Site Selection and Feasibility Analysis - Maryland



TRC identified substation sites in the State of Maryland for the potential development and interconnection of photovoltaic arrays into the electrical grid. The initial phase of the site selection study involved the acquisition of public domain mapping, aerial photography, and data on the electrical system such as substation voltages and distribution circuit availability.

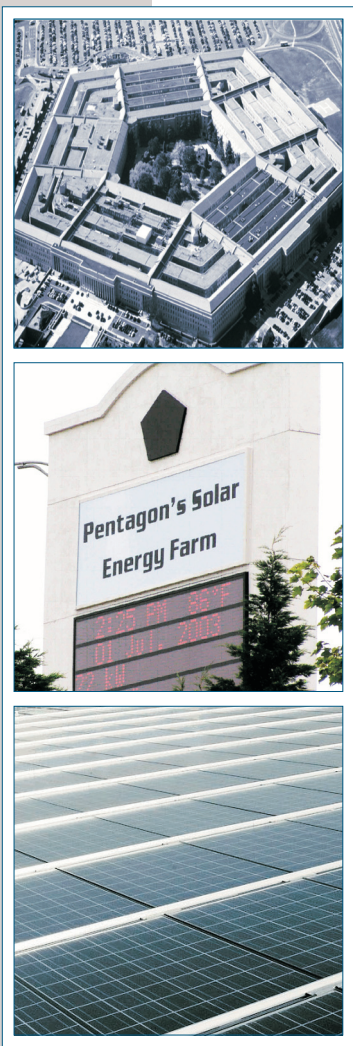
TRC then went through a ranking process of potential sites using the following criteria: amount of available land, substation voltages, available distribution circuits, and the feasibility of interconnection. Substations having available medium voltage buses (34.5kV and below) were given preference over higher voltage substation buses (69kV and up) due to the lower interconnection costs. Five potential sites were culled from data set.

TRC Performed site reconnaissance at each of these sites to more rigorously assess and identify the preferred sites and development characteristics. With respect to the electrical systems, substation voltage and interconnection feasibility were confirmed; site and surrounding land uses were assessed with respect to property availability, site topography, land use/land cover, and surrounding land uses; distribution circuit voltages and potential routes were identified. Finally, TRC made budgetary estimates of feasible substation and distribution interconnections for the top five ranked sites to assist the client in making site comparisons.

**Project Location:**  
*Maryland*

**Contract Award:**  
*Confidential*

# Pentagon's Solar Energy Farm



TRC provided design, engineering, and construction services for the installation of an "intelligent building" system at the Pentagon, one of the world's largest office buildings. TRC's two initial activities, part of the renovation program following the September 11, 2001 terrorist attack, included design, engineering, and construction of the Pentagon's Solar Energy Farm. The Solar Energy Farm consists of a photovoltaic (PV) system that produces more than 110kW of renewable electricity, and a 75.6kW solar hot water system that supplements domestic hot water requirements.

TRC was also involved in the design, engineering, and installation of a full-function digital control system at the Pentagon's heating and refrigeration plant. This system controls and operates the chillers and boilers to optimize the Pentagon's heating, ventilation, and air conditioning systems. The digital control system also coordinates electric circuits, lighting, sewage systems, and fire alarms. With this technology, the Pentagon monitors and manages its energy consumption with the latest HVAC, energy metering, and sub-metering technology.

"This showcase energy farm allows the Department of Defense to satisfy its renewable energy goals while promoting 'green' distributed generation technologies to other government agencies," said Bob Billak, Pentagon Reservation Energy Manager. Billak added: "TRC's knowledge of building systems coupled with its streamlined approach to our requirements resulted in flawless performance."

Under this contract, TRC provided:

- Design, engineering and construction of the Pentagon's Solar Energy Farm.
- Design, engineering and installation support of a full-function digital control system at the Pentagon's heating and refrigeration plant.

**Project Location:**  
Washington, DC

**Contract Award:**  
Confidential

**Completion Date:**  
2006



# Contact



**William Labbe**

249 Western Avenue

Augusta, ME 04330

207.620.3875

*wlabbe@trcsolutions.com*





## APPENDIX N: Smart Energy Capital, LLC Qualifications



## Company Profile - Smart Energy Capital

### Overview

Smart Energy Capital, LLC (“Smart Energy” or the “Company”) develops and finances solar PV projects throughout North America. The Company’s management team has extensive experience in solar project development, structured finance and investment management. Prior to founding the Company in 2009, the Company’s management team served as senior executives at SunEdison and Lehman Brothers, where they gained direct, firsthand experience in the industry. Their experience includes development of over 300 MW of solar PV projects and the raising of over \$200bn of structured capital for a wide range of asset types. In addition, one of the Company’s managing partners successfully raised and invested in excess of \$1bn as an investment manager.

Smart Energy’s core business consists of developing, financing and investing in distributed generation solar PV projects ranging in size from 250 kilowatts to 10 megawatts for commercial and government entities (the “retail business”). The Company also develops, finances and invests in distributed generation solar PV projects ranging in size from 1 megawatt to 20 megawatts for utilities (the “wholesale business”). Smart Energy typically originates, develops, finances and operates these retail and wholesale solar projects and sells the power under long-term power purchase agreements. This model enables the power purchasers to consume solar energy without any upfront capital cost or any ongoing maintenance responsibilities.

In addition to Smart Energy’s development business, the Company also serves as an advisor and capital arranger for a variety of entities with an interest in the solar industry ranging from manufacturers to power purchasers. Smart Energy utilizes its intellectual capital together with its broad relationships with capital providers to enable its clients to meet their solar energy objectives and optimize solutions.

The key components of the Company’s development and financing business model are (i) its proprietary project origination channels with strategic origination partners and (ii) its innovative, captive financing program with strategic investment partners. These components enable the Company to originate proprietary project development opportunities on a national scale and in a low cost manner and provide 100% of the capital necessary for project construction and long-term ownership in a standardized, predictable manner.





## **Strategic Project Origination Partnerships with CB Richard Ellis and Tremco Roofing**

The Company's key strategic origination partners include CB Richard Ellis and Tremco Roofing and Building Maintenance. CB Richard Ellis is the world's largest commercial real estate services company, with over 30,000 employees and over 2.2bn square feet of properties and corporate facilities under management (including properties for 85 of the Fortune 100 companies). Tremco Roofing and Building Maintenance is the leader in the North American high-end institutional roofing market, with over 200 sales representatives in the United States serving clients in a wide range of market segments including education, Federal government, healthcare, state and local government, commercial, industrial and technology. The Company serves as the exclusive solar development and financing company for its Strategic Origination Partners and their respective clients.


## **\$180 million Strategic Capital Partnership with Duke Energy and Integrys Energy**

Smart Energy has established a strategic partnership with two large utilities, Duke Energy (NYSE: DUK) and Integrys Energy (NYSE: TEG), to provide 100% of the capital to build, own and operate commercial scale solar PV projects throughout the United States. The initial funding capacity of the program is \$180 million. Under the program, Smart Energy develops the projects and transfers ownership of the projects to the partnership between Duke Energy Generation Services and Integrys Energy Services prior to the start of construction. The Duke/Integrys partnership provides 100% of the capital to build the projects, and owns, operates and maintains the projects during their lifetimes. The partnership has sufficient "tax capacity" to fully utilize all available Federal tax benefits associated with the solar PV projects, which optimizes the cost of project capital.

Duke and Integrys have significant experience in owning, operating and maintaining solar PV projects, other renewable energy projects as well as fossil fuel projects. The two companies currently own, operate and maintain several thousand megawatts of power generation in the aggregate.

Duke Energy Generation Services, part of Duke Energy's Commercial Businesses, is a leader in developing innovative renewable energy solutions, including wind, solar and biopower projects. DEGS builds, owns and operates electric generation for large energy consumers, municipalities, utilities and industrial facilities. DEGS is also working to build commercial transmission capacity to help the U.S. meet its energy needs of the future. Headquartered in Charlotte, N.C., Duke Energy is a Fortune 500 company





traded on the New York Stock Exchange under the symbol DUK. More information about the company is available on the Internet at: [www.duke-energy.com](http://www.duke-energy.com).

Established in 1994, Integrys Energy Services, Inc. provides competitive energy supply solutions, structured products, and strategies that allow retail residential, commercial, and industrial customers to manage their energy needs. Its principal energy marketing operations are in the northeastern quadrant of the United States. Through its subsidiary, Integrys Energy Services – Natural Gas LLC, Integrys offers natural gas products to a full range of end-users throughout the Midwest. Areas of generation expertise include cogeneration, distributed generation, renewables such as solar and landfill gas, as well as clean fuel generation, with facilities in selected markets throughout the United States. More information about Integrys Energy Services is available online at [www.integrysenergy.com](http://www.integrysenergy.com).

### Project Experience

Smart Energy's strategic capital partners, Duke Energy and Integrys Energy, have significant experience in owning, operating and maintaining solar PV projects which sell solar energy to commercial, government and utility customers under long-term power purchase agreements. On an aggregate basis, Smart Energy's strategic capital partners currently own and operate 23 solar PV projects throughout the United States with an aggregate capacity in excess of 28 MW, including the following representative projects:

Power Purchaser	# of Sites	Location	Type	Aggregate Size
CPS Energy	1	TX	Ground	16 MW
Arizona State University	3	AZ	Parking/Roof	1.7 MW
Harvard University	1	MA	Roof	0.5 MW
North Carolina Municipal Power Agency No.1	1	NC	Ground	1 MW
Energy United	1	NC	Ground	1 MW
JC Penny	9	CA and NJ	Roof	3.9 MW
Toyota	1	NJ	Roof	1.5 MW
AT&T	1	NJ	Roof	0.8 MW





## Management Team

### **Konstantin Braun – Managing Partner**

14 years of structured finance and financial engineering experience; structured, rated and marketed over \$100bn of transactions including securitizations for Citibank, SallieMae, Ford, PSE&G, Dunkin' Donuts, ILFC, Hertz and Crown Castle. Formerly a Managing Director at Lehman Brothers, most recently Head of ABS/MBS Structuring; provided debt structuring expertise in connection with the origination and execution of asset-backed securities collateralized by a wide range of asset types; in addition, provided loan pricing and business strategy for Lehman's proprietary, non-mortgage consumer finance origination and securitization platforms. M.A. in Economics from Yale University; B.S. in Economics/Mathematics from Moscow University.


### **Mike Grenier - Managing Partner**

10 years of renewable energy project development, project finance, and environmental policy experience; direct, hands-on experience with the acquisition, development, design and/or construction of over 8,000 MW of utility-scale solar and wind projects in the United States, Canada and Europe, including the first utility-scale solar PV project in Canada and the first wind farm in Idaho. Formerly led the establishment of SunEdison Europe and Canada, as Senior Director of Business Development; in less than one year, constructed over \$100mm of projects and acquired a 300 MW project pipeline representing over \$1bn in investment value. Formerly Director of Business Development at Ridgeline Energy; led strategy and finance, and helped develop Ridgeline's 8,000 MW project portfolio. Ridgeline was subsequently sold to the French energy company Veolia for \$72mm. B.A. with honors in Public Policy from Stanford University and an M.B.A. from the University of Maryland.

### **Rob Krugel - Managing Partner**

15 years of investment banking experience in structured finance; pioneered several innovative financing structures including the first whole business securitization in the United States, the first use of securitization to finance a leveraged buy-out and the first capital markets based warehouse for residential mortgage originators; led many high profile, complex structured financings including transactions for Cerberus (Debis Airfinance), Clayton, Dubilier & Rice/Carlyle/Merrill Lynch (Hertz), Bain Capital/Carlyle/Thomas H. Lee Partners (Dunkin Brands), SBA Communications, Crown Castle and Dominos Pizza. Formerly a Managing Director at Lehman Brothers, most recently Head of Structured Finance; began career as corporate lawyer at Cravath,





Swaine & Moore. J.D., cum laude, from Harvard Law School; B.A. in Economics with high distinction and Phi Beta Kappa from the University of Michigan.

**Brian Weisman - Managing Partner**

18 years of proven investment acumen, portfolio management and entrepreneurial successes. Co-founded Fort Point Capital (\$600mm hedge fund), from Apr. 2000-Dec. 2006 generated a 69.5 percent net unlevered return (92.6 percent gross) while the S&P 500 index returned -5.4 percent; previously Managing Director at Montgomery/Bank of America Securities and analyst at the Federal Reserve. M.B.A. from the Walter Haas School of Business at University of California at Berkeley with an emphasis in Finance; B.A. in Economics and Psychology from the University of Michigan.

More information about the company is available on the Internet at:

[www.smartenergycapital.com](http://www.smartenergycapital.com).



## APPENDIX O: Smart Energy Capital Letter of Interest



**CONFIDENTIAL**

December 16, 2010

Mr. John P. DeVillars  
Managing Partner  
BlueWave Capital, LLC  
31 Milk Street  
Boston, MA 02109

Re: Town of Amherst Solar PV Project

Dear Mr. DeVillars:

Thank you for presenting Smart Energy Capital with the opportunity to finance, own and operate a solar PV project on behalf of the Town of Amherst. We are pleased that the Town of Amherst has selected its landfill for a solar installation and we very much look forward to working with BlueWave Capital to bring clean, renewable energy to Amherst at a stable, predictable, and affordable price.

Founded in 2009, Smart Energy Capital is a leader in the financing and development of solar energy projects. We work with a wide range of entities including equipment manufacturers, installers, developers, real estate and building services companies, construction companies, real estate owners and power purchase agreement (PPA) providers to provide flexible, cost-effective capital to solar projects. In order to provide the necessary capital for project construction and long-term project ownership, we formed a strategic partnership with two large utilities, Duke Energy (NYSE: DUK) and Integrys Energy (NYSE: TEG) (see attached press release). In partnership with Duke and Integrys, we created a comprehensive funding program for commercial scale solar PV projects throughout the United States. Our funding program has an initial capacity of \$180 million and provides 100% of the capital to build, own and operate the projects. We believe that having two large utilities as the long-term project owners and operators adds significant value to our commercial, government and utility power purchaser clients.

Smart Energy Capital is very interested in financing the Amherst solar project with BlueWave serving as the project developer. Through our partnership with Duke and Integrys, Smart Energy Capital would provide 100% of the capital to construct the project. We and our investment partners would own, operate and maintain the project and sell the solar energy to Amherst under a long-term power purchase agreement at a price which would produce savings for Amherst. In addition, we would enter into a long-term lease with Amherst under which Amherst would receive an ongoing income stream for leasing the site to us.



We have reviewed BlueWave's pricing assumptions and project pro forma and find them to be sound and financeable. Please note that this letter of interest is preliminary and non-binding and does not represent a commitment. Any commitment will be subject to satisfactory completion of due diligence, all required internal approvals, including from Duke and Integrys, and satisfactory definitive documentation.

We appreciate the opportunity to join your team and look forward to working with you and the Town of Amherst on this endeavor.

Sincerely,

Smart Energy Capital, LLC

By: 

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Name: Robert Krugel  
Title: Managing Partner



## NEWS RELEASE

Duke Energy Corporation  
P.O. Box 1009  
Charlotte, NC 28201-1009

Oct. 13, 2010

### MEDIA CONTACTS

Duke Energy	Greg Efthimiou	704-382-1925
	24-Hour	800-559-3853
Integrys Energy Services	Joel Jansen	920-617-6029
Smart Energy Capital	Rob Krugel	914-595-2641

### **Duke Energy, Integrys Energy Services and Smart Energy Capital Launch Partnership to Build and Finance Solar Projects throughout U.S.**

CHARLOTTE, N.C. – Duke Energy, Integrys Energy Services and Smart Energy Capital today announced the launch of a partnership to build and finance distributed solar projects throughout the United States.

Through the partnership, Duke Energy Generation Services (DEGS) and Integrys Energy Services (Integrys) will focus on jointly owning rooftop and smaller ground-mounted photovoltaic (PV) solar projects that deliver electricity to investment-grade commercial, government and utility customers under long-term power purchase agreements. Smart Energy Capital will develop the projects and arrange financing, enabling DEGS and Integrys to create a streamlined, end-to-end approach to bringing solar projects to market.

“What makes this partnership unique in the marketplace is its focus on distributed solar solutions that produce renewable electricity close to where it is used, rather than at centralized power plants,” said Greg Wolf, DEGS senior vice president and head of the unit’s commercial solar business. “The companies involved bring a wealth of project development, construction, management and financing expertise to the partnership.”

- more -



DEGS, part of Duke Energy Corporation's (NYSE: DUK) Commercial Businesses, and Integrys Energy Services, a subsidiary of Integrys Energy Group (NYSE: TEG), believe the majority of PV solar growth over the next several years will involve commercial-scale ground-mounted and rooftop applications. While DEGS and Integrys will continue to independently develop commercial solar projects pursuant to their respective strategies, this partnership will serve as a way to cooperatively boost growth in an attractive segment of the solar market.

"We have invested more than \$65 million in 20 different distributed generation solar projects across the U.S. with a combined capacity of more than 10 megawatts," said Joel Jansen, managing director and head of energy assets at Integrys Energy Services. "Partnering with DEGS and Smart Energy Capital enables us to expand our presence in this market in an efficient, strategic manner."

DEGS and Integrys will equally supply the necessary equity capital for construction and ownership of the distributed solar projects. Over the next two years, the companies intend to invest up to \$180 million in total project capital. Individual project size is expected to be 500 kilowatts and up, depending on the needs of the customer. DEGS and Integrys will be responsible for operating and maintaining the projects.

Smart Energy Capital will work with its strategic origination partners, including CB Richard Ellis (under the name CBRE Solar) and Tremco Roofing, to help customers achieve their sustainability and energy objectives on optimal terms. The financing structure of the partnership enables DEGS and Integrys to monetize all available federal tax benefits associated with the distributed solar projects.

"We believe this partnership provides a solution to one of the fundamental challenges in the commercial segment of the solar market – reliability and certainty of financing," said

Rob Krugel, managing partner of Smart Energy Capital. “We are excited to form a strategic partnership with such large, experienced and well-capitalized power project owners as DEGS and Integrys to pursue distributed solar projects wherever market opportunities in the U.S. present themselves.”

### **About Duke Energy Generation Services**

Duke Energy Generation Services, part of Duke Energy’s Commercial Businesses, is a leader in developing innovative renewable energy solutions, including wind, solar and biopower projects. DEGS builds, owns and operates electric generation for large energy consumers, municipalities, utilities and industrial facilities. DEGS is also working to build commercial transmission capacity to help the U.S. meet its energy needs of the future. Headquartered in Charlotte, N.C., Duke Energy is a Fortune 500 company traded on the New York Stock Exchange under the symbol DUK. More information about the company is available on the Internet at: [www.duke-energy.com](http://www.duke-energy.com).

### **About Integrys Energy Services, Inc.**

Established in 1994, Integrys Energy Services, Inc. provides competitive energy supply solutions, structured products, and strategies that allow retail residential, commercial, and industrial customers to manage their energy needs. Its principal energy marketing operations are in the northeastern quadrant of the United States. Through its subsidiary, Integrys Energy Services – Natural Gas LLC, Integrys offers natural gas products to a full range of end-users throughout the Midwest. Areas of generation expertise include cogeneration, distributed generation, renewables such as solar and landfill gas, as well as clean fuel generation, with facilities in selected markets throughout the United States. More information about Integrys Energy Services is available online at [www.integrysenergy.com](http://www.integrysenergy.com).

### **About Smart Energy Capital**

Founded in 2009, Smart Energy Capital is a leader in the financing and development of

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solar energy projects. The company manages the development, financing, installation and operations of distributed power plants throughout the United States and Canada using proven photovoltaic technologies. The company delivers fully managed, predictably priced solar energy services for its commercial, government and utility customers. More information about Smart Energy Capital is available at [www.smartenergycapital.com](http://www.smartenergycapital.com).

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## APPENDIX P: MA Renewable Energy Portfolio Standard

## Section

- 14.01: Authority
- 14.02: Definitions
- 14.03: Administration
- 14.04: Applicability
- 14.05: Eligibility Criteria for RPS Class I Renewable Generation Units
- 14.06: Qualification Process for RPS Class I Renewable Generation Units
- 14.07: Renewable Energy Portfolio Standard
- 14.08: Compliance Procedures for Retail Electricity Suppliers
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14.01: Authority

225 CMR 14.00 is promulgated pursuant to M.G.L. c. 25A, § 11F.

14.02: Definitions

Aggregation. A group of one or more Generation Units that receives a single Statement of Qualification from the Department under criteria and procedures set forth in 225 CMR 14.05(6).

Alternative Compliance Payment. A payment of a certain dollar amount per MWh, resulting in the issuance of Alternative Compliance Credits, which a Retail Electricity Supplier may submit to the Department in *lieu* of providing RPS Class I Renewable Generation Attributes or Solar Carve-Out Renewable Generation Attributes required under 225 CMR 14.07.

Alternative Compliance Credit. A credit obtained by a Retail Electricity Supplier upon making an Alternative Compliance Payment. Such credit is used to document compliance with 225 CMR 14.07. One unit of credit shall be equivalent to the RPS Class I Renewable Generation Attribute associated with one MWh of electrical energy output from a RPS Class I Renewable Generation Unit, or one unit of credit shall be equivalent to the Solar Carve-Out Renewable Generation Attribute associated with one MWh of electrical energy output from a Solar Carve-Out Renewable Generation Unit.

Blended Fuel. A liquid or gaseous fuel that is blended from both Eligible RPS Class I Renewable Fuel(s) and ineligible fuel(s), a portion of whose electrical energy output may qualify as RPS Class I Renewable Generation under criteria set forth in 225 CMR 14.05(3).

Business Day. A business day shall mean Monday through Friday, exclusive of state and federal legal holidays.

Certificates Obligation. A term defined in the NEPOOL GIS Operating Rules at Rule 4.1(b), or any successor rule.

Commercial Operation Date. The date that a Generation Unit first produces electrical energy for sale within the ISO-NE Control Area or within an adjacent Control Area. In the case of a Generation Unit that has been moved from a location within the ISO-NE Control Area or within an adjacent Control Area to another location in one of those Control Areas, the date that such Generation Unit first produced electrical energy for sale at its earliest location in those Control Areas. In the case of a Generation Unit that is connected to the End-use Customer's side of the electric meter or produces Off-grid Generation, the date that such Generation Unit first produces electrical energy. In the case of a Generation Unit that meets the eligibility requirements of 225 CMR 14.05 and co-fires an Eligible RPS Class I Renewable Fuel, the date when the Generation Unit first co-fires such Eligible RPS Class I Renewable Fuel.

Compliance Filing. A document filed annually by a Retail Electricity Supplier with the Department documenting compliance with 225 CMR 14.07, consistent with the format set forth in the Guidelines and submitted no later than the first day of July, or the first Business Day thereafter, of the subsequent Compliance Year.

Compliance Year. A calendar year beginning January 1 and ending December 31, for which a Retail Electricity Supplier must demonstrate that it has met the requirements of 225 CMR 14.07 and 14.08.

Control Area. A geographic region in which a common generation control system is used to maintain scheduled interchange of electrical energy within and without the region.

Department. The Massachusetts Department of Energy Resources (DOER), established by M.G.L. c. 25A.

Eligible Biomass Fuel. Fuel sources including brush, stumps, lumber ends and trimmings, wood pallets, bark, wood chips, shavings, slash and other clean wood that are not mixed with other unsorted solid wastes; by-products or waste from animals or agricultural crops; food or vegetative material; energy crops; algae; organic refuse-derived fuel; anaerobic digester gas and other biogases that are derived from such resources; and neat Eligible Liquid Biofuel that is derived from such fuel sources.

Eligible Liquid Biofuel. A liquid fuel that is derived from Eligible Biomass Fuel and that yields at least a 50 per cent reduction in Lifecycle Greenhouse Gas Emissions relative to average lifecycle greenhouse gas emissions for petroleum distillate fuel sold in 2005, as determined by the Department in consultation with the MassDEP and the Executive Office of Energy and Environmental Affairs; or that is derived from waste feedstocks consisting of previously used or discarded solid, liquid or contained gaseous material resulting from industrial, commercial or household food service activities that would otherwise be stored, treated, transferred or disposed. Waste feedstock shall include, but not be limited to, waste vegetable oils, waste animal fats, substances derived from wastewater and the treatment of wastewater, or grease trap waste. Waste feedstock shall not include petroleum-based waste or waste that otherwise meets the definition of hazardous waste, unless otherwise determined by the MassDEP.

Eligible RPS Class I Renewable Fuel. An Eligible Biomass Fuel, landfill methane gas, hydrogen derived from such fuels or hydrogen derived from water using the electrical output



of a Renewable Generation Unit, but not hydrogen derived using RPS Class I Renewable Generation if the RPS Class I Renewable Generation Attributes of such Generation are sold, retired, claimed, used or represented as part of electrical energy output or sales, or used to satisfy regulatory obligations in any jurisdictions, and not hydrogen derived directly or indirectly from ineligible fuels.

End-use Customer. A person or entity in Massachusetts that purchases electrical energy at retail from a Retail Electricity Supplier, except that a Generation Unit taking station service at wholesale from ISO-NE or self-supplying from its owner's other generating stations, shall not be considered an End-use Customer.

Generation Attribute. A non-price characteristic of the electrical energy output of a Generation Unit including, but not limited to, the Unit's fuel type, emissions, vintage and RPS eligibility.

Generation Unit. A facility that converts a fuel or an energy resource into electrical energy.

Geothermal Energy. Heat energy stored in the Earth's crust that can be accessed for electric power generation.

GIS Certificate. An electronic record produced by the NEPOOL GIS that identifies Generation Attributes of each MWh accounted for in the NEPOOL GIS.

Guidelines. A set of clarifications, interpretations, and procedures, including forms, developed by the Department to assist in compliance with the requirements of 225 CMR 14.00. The Department may issue new or revised Guidelines from time to time. Each Guideline shall be effective on its date of issuance or on such date as is specified therein, except as otherwise provided in 225 CMR 14.00.

Historical Generation Rate. The average annual electrical production from a Generation Unit that meets the requirements of 225 CMR 14.05(1)(a), stated in MWhs, for the three calendar years 1995 through 1997, or for the first 36 months after the Commercial Operation Date if that date is after January 1, 1995.

Hydroelectric Energy. Electrical energy from a Generation Unit that uses flowing freshwater as the primary energy resource, with or without a dam structure or other means of regulating water flow, and that is not located at a facility that uses mechanical or electrical energy to pump water into a storage facility (*i.e.*, a so-called "pumped-storage facility").

Impacted Watershed. All water bodies or areas of land hydrologically connected to a hydroelectric facility, whether located upstream or downstream, which may experience any alteration of their physical, biological, or ecological characteristics as a result of the operation or increased capacity expansion of a Generation Unit.

ISO-NE. ISO New England Inc., the independent system operator for New England, the regional transmission organization for most of New England, which is authorized by the Federal Energy Regulatory Commission (FERC) to exercise for the New England Control Area the functions required pursuant to the FERC's Order No. 2000, the FERC's corresponding regulations, and any successor FERC orders and regulations.

ISO-NE Settlement Market System. The ISO-NE's electronic database system into which all real-time load and generation data are entered and from which such data are provided to the NEPOOL GIS.

Lifecycle Greenhouse Gas Emissions. The aggregate quantity of greenhouse gas emissions, including direct emissions and significant indirect emissions such as significant emissions from land use changes, as determined by the Department in consultation with the MassDEP and the Executive Office of Energy and Environmental Affairs, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.

Low Impact Hydro Power Institute (LIHI). A non-profit 501(c)(3) organization located in Portland, Maine, whose stated purpose is to reduce the impacts of hydropower generation through the certification of hydropower projects that have avoided or reduced their environmental impacts pursuant to the Low Impact Hydropower Institute's criteria.

Marine or Hydrokinetic Energy. Electrical energy derived from waves, tides and currents in oceans, estuaries and tidal areas; free-flowing water in rivers, lakes, streams, and human-made channels, provided that such water is not diverted, impounded, or dammed; or differentials in ocean temperature, called ocean thermal energy conversion.

Massachusetts Renewable Energy Trust. The Trust under G.L. ch. 23J § 9, which administers renewable energy programs for the Commonwealth.

MassDEP. The Massachusetts Department of Environmental Protection established by G.L. c. 21A, § 7.

Megawatt-hour (MWh). A unit of electrical energy or work equivalent to one million watts of power operating for one hour.

NEPOOL GIS. The NEPOOL Generation Information System, which includes a generation information database and certificate system, operated by the New England Power Pool (NEPOOL), its designee or successor entity, that accounts for Generation Attributes of electrical energy consumed within, imported into, or exported from the ISO-NE Control Area.

Non-intermittent Generation Unit. A Generation Unit having a capacity factor of 50 per cent or greater, as determined by the Department.

North American Electric Reliability Council (NERC) Tag. An identification of an electrical energy interchange transaction assigned in accordance with rules set forth by the North American Electric Reliability Council.

Off-grid Generation. The electrical energy produced by a Generation Unit that is not connected to a utility transmission or distribution system.

Operator. Any person or entity who has charge or control of a Generation Unit subject to 225 CMR 14.00, including without limitation a duly authorized agent or lessee of the Owner,

or a duly authorized independent contractor.

Owner. Any person or entity who, alone or in conjunction with others, has legal ownership, a leasehold interest, or effective control over the real property or property interest upon which a Generation Unit is located, or the airspace above said real property, including without limitation a duly authorized agent of the Owner. For the purposes of 225 CMR 14.02, Owner does not mean a person or entity holding legal title or security interest solely for the purpose of providing financing.

Power Conversion Technology. The design, process, and equipment by which an energy resource is converted into useful energy, as specified in Guidelines.

Relevant Hydroelectric Agency. A federal, state or provincial agency with oversight over fish and wildlife, water quality, river flows, fish passage and protection, mitigation and enhancement opportunities, related to a hydroelectric facility located in the Impacted Watershed or that impacts downstream or upstream passage of fish and wildlife.

Renewable Generation. The electrical energy output of a Renewable Generation Unit.

Renewable Generation Attribute. The Generation Attribute of the electrical energy output of a specific Generation Unit that derives from the Unit's production of Renewable Generation.

Renewable Generation Unit. A Generation Unit that uses an Eligible RPS Class I Renewable Fuel, Hydroelectric Energy, waste-to-energy that is a component of conventional municipal solid waste plant technology in commercial use, or any of the fuels, energy resources or technologies set forth in 225 CMR 14.05(1)(a).

Retail Electricity Product. An electrical energy offering that is distinguished by its Generation Attributes and that is offered for sale by a Retail Electricity Supplier to End-use Customers.

Retail Electricity Supplier. A person or entity that sells electrical energy to End-use Customers in Massachusetts, including but not limited to electric utility distribution companies supplying basic service or any successor service to End-use Customers. A Municipal Lighting Plant shall be considered a Retail Electricity Supplier; however, it shall be exempt from the obligations of a Retail Electricity Supplier under 225 CMR 14.00 so long as and insofar as it is exempt from the requirements to allow competitive choice of generation supply pursuant to M.G.L. c. 164, § 47A.

RPS Class I Renewable Generation. The electrical energy output of a RPS Class I Renewable Generation Unit, or that portion of the electrical energy output of an RPS Class I Renewable Generation Unit that qualifies under (1) the Special Provisions for Incremental Generating Capacity pursuant to 225 CMR 14.05(2) on or after January 1, 2009; (2) a Vintage Waiver, pursuant to 225 CMR 14.05(2) issued before January 1, 2009; (3) a Co-firing and Blended Fuel Waiver, pursuant to 225 CMR 14.05(3); (4) the Special Provisions for a Generation Unit Located in a Control Area Adjacent to the ISO-NE Control Area; or (5) any other applicable provision of 225 CMR 14.00.

RPS Class I Renewable Generation Attribute (Attribute). The Generation Attribute of the electrical energy output of a specific RPS Class I Renewable Generation Unit that derives

from the Unit's production of RPS Class I Renewable Generation.

RPS Class I Renewable Generation Unit. A Generation Unit or Aggregation that has received a Statement of Qualification from the Department, including a Generation Unit or Aggregation termed a New Renewable Generation Unit in a Statements of Qualification issued by the Department pursuant to 225 CMR 14.00 before January 1, 2009, but does not include Solar Carve-Out Renewable Generation Units.

Solar Carve-Out Renewable Generation. The electrical output of a Solar Carve-Out Renewable Generation Unit that qualifies for the Massachusetts Solar Carve-Out.

Solar Carve-Out Renewable Generation Attribute. The Generation Attribute of the electrical energy output of a specific Solar Carve-Out Renewable Generation Unit that derives from the Unit's production of Solar Carve-Out Renewable Generation.

Solar Carve-Out Renewable Generation Unit. A Generation Unit or Aggregation that has received a Statement of Qualification from the Department that specifies its qualification for participation in the Solar Carve-Out under 225 CMR 14.05(4).Statement of Qualification. A written document from the Department that qualifies a Generation Unit or Aggregation as an RPS Class I Qualified Generation Unit or a Solar Carve-Out Renewable Generation Unit, or that qualifies a portion of the annual electrical energy output of a Generation Unit or Aggregation as RPS Class I Renewable Generation.

Valid Air Permit. Within the United States, a current and effective authorization, license, certificate, or like approval to construct and/or operate a source of air pollution, issued or required by the regulatory agency designated in the applicable State Implementation Plan to issue permits under the Clean Air Act, 42 U.S.C. §§ 7401, *et seq.* In jurisdictions outside of the United States, it shall be a document demonstrating an equivalent authorization.

Vintage Generation Unit. A Generation Unit that meets the requirements of 225 CMR 14.05(1), that has a Commercial Operation Date of December 31, 1997, or earlier, and for which the Department issued a Statement of Qualification under the Vintage Waiver provision in 225 CMR 14.05(2) before January 1, 2009.

Vintage Generation. The electrical energy output of a Vintage Generation Unit during the period of the Unit's Historical Generation Rate.

#### 14.03: Administration

225 CMR 14.00 shall be administered by the Department.

#### 14.04: Applicability

225 CMR 14.00 applies to Retail Electricity Suppliers and to the Owners or Operators of RPS Class I Renewable Generation Units and Solar Carve-Out Renewable Generation Units.

#### 14.05: Eligibility Criteria for RPS Class I and Solar Carve-Out Renewable Generation Units

(1) Eligibility Criteria. A Generation Unit may qualify as an RPS Class I Renewable Generation Unit or a Solar Carve-Out Renewable Generation Unit subject to the limitations

in 225 CMR 14.05.

(a) Fuels, Energy Resources and Technologies. The Generation Unit shall use one or more of the fuels, energy resources and/or technologies listed in 225 CMR 14.05(1)(a)1 through 9.

1. Solar photovoltaic or solar thermal electric energy.
2. Wind energy.
3. Ocean thermal, wave or tidal energy.
4. Fuel cells using an Eligible RPS Class I Renewable Fuel.
5. Landfill methane gas, provided that such gas is collected and conveyed directly to the Generation Unit without use of facilities used as common carriers of natural gas, except that such landfill methane gas may be collected from a landfill entirely within the ISO-NE Control Area or an adjacent Control Area and transported to a Generation Unit within one of those Control Areas via a common carrier of natural gas, subject to documentation satisfactory to the Department of the gas transportation and related contracts.
6. Hydroelectric. An Generation Unit that uses Hydroelectric Energy may qualify as an RPS Class I Generation Unit, subject to the limitations in 225 CMR 14.05(1)(a)6.
  - a. The Unit has a nameplate capacity up to 25 megawatts, or increased capacity installed or efficiency improvements implemented after December 31, 1997, the aggregate of which increased capacity or efficiency improvements does not exceed 25 megawatts.
  - b. The Unit does not involve any dam or water diversion structure constructed after December 31, 1997, or pumped storage of water.
  - c. The Unit does not generate Marine or Hydrokinetic Energy.
  - d. The Unit meets appropriate and site-specific standards that address adequate and healthy river flows, water quality standards, fish passage and protection measures and mitigation and enhancement opportunities in the impacted watershed, as determined by the Department in consultation with Relevant Hydroelectric Agencies. The Unit shall demonstrate compliance with such standards by submitting the documentation required in either 225 CMR 14.05(1)(a)6.d.i or ii.
    - i. LIHI Certification of the Unit; except that in either of the two circumstances provided in 225 CMR 14.05(1)(a)6.d.i, the Department may request further information from the applicant and the Relevant Hydroelectric Agencies as part of its review of the applicant's Statement of Qualification Application. The Department shall notify the applicant of any such input from a Relevant Hydroelectric Agency not later than 30 days after receiving such input and shall provide the applicant an opportunity to

respond to the Department not later than 30 days after the applicant's receipt of such notice from the Department.

A. If a Relevant Hydroelectric Agency identified an environmental concern and a proposed remedy to LIHI during the LIHI certification process, and such concern was not addressed in the LIHI certification to the satisfaction of the Agency, and the Agency consulted with the Owner or Operator of the Unit; or

B. If, between issuance of the LIHI certification and the Department's determination of the Unit's eligibility, a Relevant Hydroelectric Agency submits to the Department evidence of a significant environmental problem not previously known by such Agency, after consulting with the Owner or Operator of the Unit.

ii. A denial of certification from LIHI specifying the reasons the certification was denied and the applicant's proposed rationale for why the project should nevertheless receive a Statement of Qualification. In this instance, the Department shall notify and seek input from the Relevant Hydroelectric Agencies, which shall have 30 days from the date of their receipt of such notification to provide feedback to the Department. The Owner or Operator of the Unit shall be notified of any such input and shall have 30 days from receipt of such notice to respond to the satisfaction of the Department as to why its Application should be approved. The Department thereafter shall make finding of whether the Unit meets appropriate environmental safeguards despite the lack of LIHI certification.

e. The Owner or Operator of the Unit must serve notice to all Relevant Hydroelectric Agencies of its application for LIHI certification and its submission of a Statement of Qualification Application and must provide notice of such service to the Department.

f. If LIHI fails to act to certify or deny certification within 180 days from the date of submission of the Unit's application to LIHI, the Owner or Operator shall file notice of such event with the Department. The Department shall review the federal, state or provincial permits for the Unit and any submissions to LIHI by Relevant Hydroelectric Agencies, and shall make a final determination as to whether the Unit meets environmental standards specified in 225 CMR 14.05(1)(a)6.d.

g. If LIHI is unable to review for certification a Unit that is located in a Control Area adjacent to the ISO-NE Control Area and outside the United States of America, the Owner or Operator of such Unit may petition the Department for certification using the LIHI standards by an independent third party acceptable to the Department.

7. Low-emission, advanced biomass Power Conversion Technologies using an Eligible Biomass Fuel. A Generation Unit may qualify as an RPS Class I Renewable Generation Unit, provided it uses an Eligible Biomass Fuel, subject to the limitations

in 225 CMR 14.05(1)(a)7.

- a. The Department shall set forth in Guidelines low-emission eligibility criteria which will become effective on their date of issuance. Any emission eligibility criteria in subsequently revised Guidelines shall become effective 24 months from their date of issuance.
- b. A Generation Unit with a Commercial Operation Date after December 31, 1997, that is required to obtain an air permit in its jurisdiction, must possess a Valid Air Permit and must demonstrate to the satisfaction of the Department that the emission rates of the Unit do not exceed limits set forth in the Guidelines that are applicable for the date on which the Department receives the Unit's Statement of Qualification Application.
- c. A Generation Unit with a Vintage Waiver that is required to obtain an air permit in its jurisdiction must possess a Valid Air Permit and must demonstrate to the satisfaction of the Department that the emission rates of the Unit do not exceed limits set forth in the Guidelines that are applicable for the date on which the Department receives the Unit's Statement of Qualification Application.
- d. A Generation Unit that is not required to obtain an air permit in its jurisdiction must demonstrate to the satisfaction of the Department that its emissions are consistent with criteria set forth in the Guidelines that are applicable for the date on which the Department receives the Unit's Statement of Qualification Application.
- e. In the case of a Generation Unit for whose size, type, or fuel the Guidelines do not provide applicable emission limits, the Department will determine appropriate limits in consultation with the MassDEP.

8. Marine or Hydrokinetic Energy.

9. Geothermal Energy.

(b) Commercial Operation Date. The Commercial Operation Date shall be after December 31, 1997, unless the Generation Unit received a Statement of Qualification with a Vintage Waiver prior to January 1, 2009. In the case of a Solar Carve-Out Renewable Generation Unit, the Commercial Operation Date shall be after December 31, 2007.

(c) Metering. The electrical energy output from a Generation Unit shall be verified by the ISO-NE or by an independent verification system or person participating in the NEPOOL GIS accounting system as an independent Third Party Meter Reader, as defined in Rule 2.5(j) of the NEPOOL GIS Operating Rules, or any successor rule, and approved by the Department.

(d) Location. The Generation Unit location is subject to the limitations in 225 CMR 14.05(1)(d).

1. Off-grid Generation. If the Generation Unit produces Off-grid Generation, such



Unit must be located in Massachusetts.

2. Behind-the-meter Generation. If the Generation Unit is wired to the electrical system on the End-use Customer's side of a retail electric meter, such Unit must be located within the ISO-NE Control Area.

(e) Capacity Obligation. The Generation Unit's generating capacity is subject to the following obligations:

1. The amount of the generation capacity of the Generation Unit whose electrical energy output is claimed as RPS Class I Renewable Generation or Solar Carve-Out Renewable Generation shall not be committed to any Control Area other than the ISO-NE Control Area unless such Generation Unit has entered into a Capacity Obligation in another Control Area before the start of the first available compliance year for the ISO-NE Forward Capacity Market, in which case this subsection shall apply upon the expiration of that Capacity Obligation. However, if the Generation Unit executed a contract for the sale of RPS Class I Renewable Generation Attributes or RPS Class I Renewable Generation, or both, before January 1, 2009, for a term of at least 2 years, the contract price of which relied on the receipt of capacity payments from a control area adjacent to the ISO-NE control area, and the Generation Unit can demonstrate such reliance to the satisfaction of the Department, this requirement shall not take effect for that Generation Unit until the expiration of that contract.

2. The Generation Unit Owner or Operator of a Non-intermittent Generation Unit shall commit to the ISO-NE Control Area the amount of the capacity of that Unit claimed as RPS Class I Renewable Generation or Solar Carve-Out Renewable Generation by submitting by the applicable deadline a show of intent for the ISO-NE Forward Capacity Auction that is the earliest available for the Unit after the Owner or Operator has submitted a Statement of Qualification Application. The Owner or Operator of such unit must also clear the Forward Capacity Auction for which it has qualified, even if it must participate as a price taker. The requirements of this paragraph do not apply to Generation Units for which DOER has received an administratively complete Statement of Qualification Application prior to July 2, 2008.

3. An RPS Class I Renewable Generation Unit or Solar Carve-Out Renewable Generation Unit that was deemed unqualified by the ISO-NE for participation in the ISO-NE Forward Capacity Market for technical reasons may commit capacity to another control area and may receive GIS Certificates for the energy sold into ISO-NE Control Area, subject to a determination by the Department.

4. An RPS Class I Renewable Generation Unit or a Solar Carve-Out Renewable Generation Unit that has registered with the relevant distribution company as a net metering facility pursuant to 220 CMR 18.00, shall be exempt from the capacity obligation under 225 CMR 14.05(1)(e) while the facility is net metering.

(2) Special Provisions for Incremental Generation. An increase in electrical energy output of a Generation Unit with a Commercial Operation Date on or before December 31, 1997, may qualify as RPS Class I Renewable Generation, subject to the following limitations:

(a) The Generation Unit must meet the eligibility requirements of 225 CMR 14.05 with the exception of 225 CMR 14.05(1)(b).

(b) The portion of the total electrical energy output of the Generation Unit that qualifies as RPS Class I Renewable Generation in a given calendar year shall be the portion attributable to incremental new generating capacity or efficiency improvements installed or implemented after December 31, 1997, using equipment that was not utilized in any Renewable Generation Unit within the ISO-NE Control Area or within Control Areas adjacent thereto on or before December 31, 1997.

(b) The portion of the electrical energy output of a Generation Unit that does not qualify as RPS Class I Renewable Generation under the provisions of this subsection or under a Statement of Qualification granted to a Vintage Generation Unit prior to January 1, 2009, may qualify as RPS Class II Renewable Generation if it applies for and meets the eligibility standards of the RPS Class II Regulations set forth in 225 CMR 15.00

(3) Co-Firing and Blended Fuel Waiver. All or a portion of the electrical energy output of a Generation Unit that uses ineligible fuel in conjunction with an Eligible RPS Class I Renewable Fuel, whether by co-firing such fuels or by using a Blended Fuel, may qualify as RPS Class I Renewable Generation provided the Generation Unit meets the eligibility requirements of 225 CMR 14.05, subject to the limitations in 225 CMR 14.05(3).

(a) The portion of the total electrical energy output that qualifies as RPS Class I Renewable Generation in a given time period shall be equal to the ratio of the net heat content of the Eligible RPS Class I Renewable Fuel consumed to the net heat content of all fuel consumed in that time period.

(b) If using a Blended Fuel or if co-firing an ineligible fuel with an Eligible Biomass Fuel, the entire Generation Unit must meet the requirements of an advanced biomass Power Conversion Technology as set forth in 225 CMR 14.05(1)(a)7.

(c) If using an Eligible Biomass Fuel, the Generation Unit must demonstrate to the satisfaction of the Department that the emission rates for the entire Generation Unit are consistent with rates prescribed by the MassDEP for comparably fueled Generation Units in the Commonwealth. The Department may require the Generation Unit Owner or Operator to retain at its own expense a third-party consultant deemed satisfactory to the Department, to provide DOER and the MassDEP with assistance in this determination.

(d) The Generation Unit must provide with its Statement of Qualification Application a fuel supply plan that specifies each and every fuel that it intends to use, in what relative proportions either in co-firing or in a Blended Fuel, and with what individual input heat values. Such plan shall include the procedures by which the Unit will document to the satisfaction of the Department its compliance with the plan.

(e) The provisions of 225 CMR 14.05(3) shall not apply to the incidental use of ineligible fuels for the purpose of cold starting a Generation Unit that otherwise exclusively uses an Eligible RPS Class I Renewable Fuel.

(4) Special Provisions for a Solar Carve-Out Generation Unit.

(a) The Solar Carve-Out Renewable Generation Unit must be used on-site, located in the Commonwealth of Massachusetts, and be interconnected with the electric grid. On-site use shall include any existing load previously located at the site of the Unit or any parasitic load that may result from the installation of the Unit, and is wired to receive a portion of the electrical energy output from the Unit before the balance of such output passes through the Unit's metered interconnection onto the electric grid. **The maximum capacity of a Unit shall be 2 MW (as measured on a nameplate capacity basis in direct current) that is attached to the Unit's meter.**

(b) If the construction and installation of a Unit was funded through a program administered prior to January 1, 2010, by the Massachusetts Renewable Energy Trust, or if the Unit was funded substantially from American Recovery and Reinvestment Act, P.L. 111-5 (ARRA) for the installation of that Unit, the Unit shall not be eligible to participate in the Solar Carve-Out. Substantial shall mean for this purpose more than 67 per cent of total installed cost. Notwithstanding this subsection, if the substantial funding that a Unit receives is from a payment in lieu of tax credit under section 1603 of ARRA, the Unit shall be eligible for Solar Carve-Out Renewable Generation Attributes.

(c) Owners or Operators of Units under this subsection are eligible to participate in the Solar Credit Clearinghouse Auction for the Opt-In Term specified in the Statement of Qualification of the Unit. The Department or its agent shall maintain an account, known as Solar Credit Clearinghouse Auction Account on the NEPOOL GIS into which eligible Owners or Operators may deposit Solar Carve-Out Renewable Generation Attributes. The Solar Credit Clearinghouse Auction Account shall be available for deposit of Attributes only from May 16 to June 15, inclusive.

(d) An Owner or Operator that opts to deposit Solar Carve-Out Renewable Attributes into the Solar Credit Clearinghouse Auction Account shall be assessed, at the completion of the auction, a usage fee of 5 per cent of the auction price for each Attribute deposited into Solar Credit Clearinghouse Auction Account. This usage fee shall be deposited into the Alternative Compliance Payment fund under 225 CMR 14.08(3).

(e) Those Attributes deposited into Solar Credit Clearinghouse Auction Account shall then be retired and reissued by NEPOOL GIS as Re-minted Auction Account Attributes. These Attributes shall be eligible in either of the two subsequent Compliance Years from the year in which they were generated to meet obligations under the Massachusetts Solar Carve-Out Minimum Standard. The Department or its agent shall conduct an auction for those Attributes. Any entity wishing to purchase Re-minted Auction Account Attributes may participate and enter a bid. Each bid shall be for the number of Re-minted Auction Account Attributes that the bidder wishes to purchase at a fixed price of \$300 per Re-minted Auction Account Attribute.

(f) The Solar Credit Clearinghouse Auction shall be held not later than July 31. If the auction does not clear, meaning that the total number of Re-minted Auction Account Attributes bid for in the auction was less than the number of Solar Carve-Out Renewable Attributes deposited, the Department or its agent shall void the auction.

(g) If the auction under 225 CMR 14.05(4)(f) does not clear, the Department shall conduct a new auction within 3 Business Days, in which any Attributes purchased shall be eligible in any of the three subsequent Compliance Years from the year in which they were generated to meet obligations under the Massachusetts Solar Carve-Out Minimum Standard. If the auction does not clear, the Department or its agent shall void the

auction.

(h) If the auction under 225 CMR 14.05(4)(g) does not clear, the Department or its agent shall conduct another auction within 3 Business Days, at which point the Attributes shall be eligible in any of the three subsequent Compliance Years from the year in which they were generated to meet obligations under the Massachusetts Solar Carve-Out Minimum Standard. Prior to this Auction, the Department shall also recalculate the Massachusetts Solar Carve-Out Minimum Standard under 225 CMR 14.07(2)(e).

(i) When 400 MW of Solar Carve-Out Renewable Generation Units have been installed, the Department shall announce that this threshold has been reached and shall not accept any new Statement of Qualification Applications for the Solar Carve-Out Program under 225 CMR 14.05(4). Such Units are still eligible to apply as RPS Class I Renewable Generation Units.

(5) Special Provisions for a Generation Unit Located in a Control Area Adjacent to the ISO-NE Control Area. The portion of the total electrical energy output of an RPS Class I Renewable Generation Unit located in a Control Area adjacent to the ISO-NE Control Area that qualifies as RPS Class I Renewable Generation shall meet the requirements in Rule 2.7(c) and all other relevant sections of the NEPOOL GIS Operating Rules or any successor rule, and the following requirements:

(a) The Generation Unit Owner or Operator shall provide documentation, satisfactory to the Department, of a contract or other legally enforceable obligation(s) ("Legal Obligation") that is executed between the Generation Unit Owner or Operator and an electrical energy purchaser located in the ISO-NE Control Area for delivery of the Unit's electrical energy to the ISO-NE Control Area. Such documentation shall include provisions for obtaining associated transmission rights for delivery of the Unit's electrical energy from the Unit to the ISO-NE Control Area. The Generation Unit Owner or Operator shall pay for evaluation and verification of the provisions of such documentation by an independent party that is engaged or approved by the Department.

(b) The Generation Unit Owner or Operator shall provide documentation, satisfactory to the Department, that:

1. the electrical energy delivered pursuant to the Legal Obligation was settled in the ISO-NE Settlement Market System;
2. the Generation Unit produced, during each hour of the applicable month, the amount of MWhs claimed, as verified by the NEPOOL GIS administrator; if the originating Control Area employs a Generation Information System that is comparable to the NEPOOL GIS, information from that system may be used to support such documentation;
3. the electrical energy delivered under the Legal Obligation received a NERC Tag confirming transmission from the adjacent Control Area to the ISO-NE Control Area; and
4. the RPS Class I Renewable Generation Attributes have not otherwise been, nor

will be, sold, retired, claimed, used or represented as part of electrical energy output or sales, or used to satisfy obligations in jurisdictions other than Massachusetts.

(d) The Generation Unit Owner or Operator must provide an attestation in a form to be provided by the Department that it will not itself or through any affiliate or other contracted party, engage in the process of importing RPS Class I Renewable Generation into the ISO-NE Control Area for the creation of RPS Class I Renewable GIS Certificates, and then exporting that energy or a similar quantity of other energy out of the ISO-NE Control Area during the same hour.

(e) The quantity of electrical energy output from an RPS Class I Renewable Generation Unit outside the ISO-NE Control Area that can qualify as RPS Class I Renewable Generation at the NEPOOL GIS during each hour is limited to the lesser of the RPS Class I Renewable Generation actually produced by the Unit or the RPS Class I Renewable Generation actually scheduled and delivered into the ISO-NE Control Area.

(6) Special Provisions for Aggregations. An Aggregation of Generation Units that are located behind the customer meter or that are Off-grid Generation Units, each of which could independently meet the relevant requirements of 225 CMR 14.05, may receive a single Statement of Qualification and be treated as a single Qualified Renewable Generation Unit under the following criteria and procedures:

(a) Each Generation Unit in such Aggregation must be located within the same state and use the same fuel, energy resource and technology as all other Units in the Aggregation. In the instance of an Aggregation that includes a Solar Carve-Out Renewable Generation Unit, that Aggregation shall only include Units that are eligible for the Solar Carve-Out under 225 CMR 14.05(4).

(b) Each of the Owners or Operators of Generation Units within the Aggregation must enter into an agreement with a person or entity that serves as the Authorized Agent for the Aggregation in all dealings with the Department and with the NEPOOL GIS, and such agreement must include procedures by which the electrical energy output of each Unit shall be monitored and reported to the NEPOOL GIS.

(c) The Authorized Agent of the Aggregation must establish and maintain a Generator account at the NEPOOL GIS under the NEPOOL GIS Operating Rules, including all provisions for Non-NEPOOL Generator Representatives, as that term is defined in Rule 2.1(a)(vi) of those Rules, or any successor rules.

(d) The electrical energy output of each of the Generation Units in the Aggregation must be individually monitored and recorded, and it must be reported to the NEPOOL GIS as part of an aggregated total for the Aggregation, by an independent Third Party Meter Reader as defined in Rule 2.5(j) of the NEPOOL GIS Operating Rules, or any successor rule, and approved by the Department.

(7) Special Provisions for Relocated, Repowered, and Replacement Generation Units. The Department may provide a Statement of Qualification to a Generation Unit that meets one of the following categories and criteria, as well as all other relevant provisions of 225 CMR 14.05:

(a) Relocated Generation Unit. A Generation Unit whose Power Conversion

Technology was used on or before December 31, 1997, to generate electrical energy outside of both the ISO-NE Control Area and Control Areas adjacent thereto, and that is relocated into one of said Control Areas after December 31, 1997, provided that any components of the Power Conversion Technology that were not used outside of said Control Areas were first used in a Generation Unit after December 31, 1997.

(b) Repowered Generation Unit. A Generation Unit that did not utilize an Eligible RPS Class I Renewable Fuel at any time on or before December 31, 1997.

(c) Replacement Generation Unit. A Generation Unit that replaces a mothballed or decommissioned Generation Unit that had operated on the same site on or before December 31, 1997, subject to the following limitations:

1. The entire Power Conversion Technology of the existing Unit is replaced with equipment manufactured after December 31, 1997; and
2. The existing Unit has not been in commercial operation for at least five years prior to submission of the Statement of Qualification Application.

#### 14.06: Statement of Qualification Process for RPS Class I Renewable Generation Units

(1) Statement of Qualification Application. A Statement of Qualification Application shall be submitted to the Department by the Owner or Operator of the Generation Unit or Aggregation. The applicant must use the most current forms and associated instructions provided by the Department, and must include all information, documentation, and assurances required by such forms and instructions.

(2) Review Procedures.

(a) The Department will notify the applicant when the Statement of Qualification Application is administratively complete or if additional information is required pursuant to 225 CMR 14.06(1).

(b) The Department may, in its sole discretion, provide an opportunity for public comment on any Statement of Qualification Application.

(3) Issuance or Non-Issuance of a Statement of Qualification.

(a) If the Department finds that all or a portion of the electrical energy output of a Generation Unit or of an Aggregation meets the requirements for eligibility as RPS Class I Renewable Generation or a Solar Carve-Out Renewable Generation Unit pursuant to 225 CMR 14.05, the Department will provide the Owner or Operator of such Unit or Aggregation with a Statement of Qualification.

(b) The Statement of Qualification shall include any applicable restrictions and conditions that the Department deems necessary to ensure compliance by a particular Generation Unit or Aggregation with the provisions of 225 CMR 14.00.

(c) If the Generation Unit or Aggregation does not meet the requirements for eligibility as an RPS Class I Renewable Generation Unit or a Solar Carve-out Renewable

Generation Unit, the Department shall provide written notice to the Owner or Operator, including the Department's reasons for such finding.

(d) A Solar Carve-Out Renewable Generation Unit shall receive a Statement of Qualification that states that the Unit is eligible for the Massachusetts Solar Carve-Out and that specifies a term of calendar quarters, referred to as the Opt-In Term, during which period the Unit is eligible to participate in the Solar Credit Clearinghouse Auction. The Opt-In Term shall be set at the time that the Unit receives its Statement of Qualification, and the Opt-In Term shall commence with the earlier of either the first day of the calendar quarter during which occurs the RPS Effective Date, as such date is provided in 225 CMR 14.06(4), or the first day of the subsequent calendar quarter from the date of the Statement of Qualification.

(e) The length of the Opt-In Term shall be forty quarters in 2010. This Term shall be reduced by four quarters for each full 10 per cent of the Compliance Obligation that is deposited into the Solar Credit Clearinghouse Auction Account. However, in no instance shall this reduction be greater than eight quarters for one Compliance Year. For Compliance Years 2010-2016, inclusive, the Opt-in Term shall not be less than twenty quarters. For Compliance Year 2017 and later, the Department shall determine whether to set a minimum number of quarters for the Opt-in Term for the Compliance Year. The Opt-In Term shall be set at forty quarters if more than 5 per cent of the Compliance Obligation was met through ACP Payments in the previous Compliance Year. The Department shall announce the length of the Opt-in Term on July 20.

(4) RPS Effective Date. The RPS Effective Date shall be the earliest date on which electrical energy output of an RPS Class I Renewable Generation Unit or Solar Carve-Out Renewable Generation Unit can result in the creation of RPS Class I or Solar Carve-Out GIS Certificates, except that, in the case of a Biomass Unit, the RPS Effective Date shall not be earlier than the date on which the Department determines that the Unit has commenced compliance with the low-emission conditions in its Statement of Qualification, and in the case of a Hydroelectric Unit, the RPS Effective Date shall not be earlier than the date on which the Department determined that the Unit has commenced compliance with the environmental conditions in its Statement of Qualification.

(5) Notification Requirements for Change in Eligibility Status. The Owner or Operator of an RPS Class I Renewable Generation Unit or Solar Carve-Out Renewable Generation Unit shall notify the Department of any changes in the technology, operation, emissions, fuel sources, energy resources, or other characteristics of the Generation Unit that may affect the eligibility of the Unit as an RPS Class I Renewable Generation Unit or Solar Carve-Out Renewable Generation Unit. The Owner or Operator shall submit the notification to the Department no later than five days following the end of the month during which such changes were implemented. The notice shall state the date the changes were made to the RPS Class I Renewable Generation Unit or Solar Carve-Out Renewable Generation Unit and describe the changes in sufficient detail to enable the Department to determine if a change in eligibility is warranted.

(6) Notification Requirements for Change in Ownership, Generation Capacity, or Contact Information. The Owner or Operator of an RPS Class I Renewable Generation Unit or Solar Carve-Out Renewable Generation Unit shall notify the Department of any changes in the ownership, operating entity, generation capacity, NEPOOL GIS account, independent verification system for the Unit's or Aggregation's electrical energy output, or contact



information for the Generation Unit or Aggregation. The Owner or Operator shall submit the notification to the Department no later than five days following the end of the month during which such changes were implemented.

(7) Time Limit for Project Implementation. Any Statement of Qualification issued on or after the effective date of this section shall expire 48 months after the issuance date of the Statement of Qualification (the Expiration Date) unless the Commercial Operation Date of the Generation Unit or Aggregation is on or before the Expiration Date. The Department may, at its discretion, grant an extension of the Expiration Date of the Statement of Qualification upon petition by the Owner or Operator of the Generation Unit or Aggregation. If the Owner or Operator of such Unit or Aggregation desires an extension, such Owner or Operator must submit a new Statement of Qualification Application, and the decision of the Department on such new application may be made in accordance with the regulations and criteria that are applicable on the date that the Department receives that application.

(8) Expiration of Advisory Rulings. An advisory ruling issued by the Department for any proposed Generation Unit for which an administratively complete Statement of Qualification Application has not been submitted as of the effective date of this subsection, shall be deemed to have expired on that date.

(9) Suspension or Revocation of Statement of Qualification. The Department may suspend or revoke a Statement of Qualification if the Owner or Operator of an RPS Class I Renewable Generation Unit or Solar Carve-Out Renewable Generation Unit fails to comply with 225 CMR 14.00.

#### 14.07: Renewable Energy Portfolio Standard – Class I

(1) RPS Class I Minimum Standard. The total annual sales of each Retail Electricity Product sold to Massachusetts End-use Customers by a Retail Electricity Supplier shall include a minimum percentage, as specified in the table in 14.07, of electrical energy sales with RPS Class I Renewable Generation Attributes and Solar Carve-Out Renewable Generation Attributes .

#### **MASSACHUSETTS RENEWABLE ENERGY PORTFOLIO STANDARD – CLASS I**

##### **MINIMUM PERCENTAGES OF ANNUAL ELECTRICAL ENERGY SALES WITH RPS CLASS I RENEWABLE GENERATION ATTRIBUTES**

Compliance Year	Cumulative Minimum Percentage, Including Massachusetts On-site Generation	
2003	1.0	
2004	1.5	
2005	2.0	
2006	2.5	
2007	3.0	
2008	3.5	
2009	4.0	
2010	5.0	
2011	6.0	

2012	7.0	
2013	8.0	
2014	9.0	
2015	10.0	
2016	11.0	
2017	12.0	
2018	13.0	
2019	14.0	
2020	15.0	

(2) Solar Carve-Out Minimum Standard.

(a) The total annual sales of each Retail Electricity Product sold to Massachusetts End-use Customers by a Retail Electricity Supplier shall include a minimum percentage of electrical energy sales with Solar Carve-Out Renewable Generation Attributes. This percentage shall be a portion of the Supplier's obligation under 225 CMR 14.07(1) and not an additional obligation of the Supplier. For each Compliance Year, the Solar Carve-Out Minimum Standard shall be calculated as the total Solar Carve-Out compliance obligation (in MWh) as determined in 225 CMR 14.07(2)(b) through 225 CMR 14.07(2)(g), divided by the total MWh of electrical energy sales by Retail Electricity Suppliers to End-use Customers in the previous Compliance Year, as such sales are defined in 225 CMR 14.09(2)(a). This resulting percentage, or Solar Carve-Out Minimum Standard, shall be announced by the Department not later than July 20.

(b) For Compliance Year 2010, the total compliance obligation shall be established to be 34,164 MWh, calculated as 30 MW multiplied by 365 days in the year multiplied by 24 hours in the day multiplied by 0.13 (or 13%) capacity factor.

(c) For Compliance Year 2011, the total compliance obligation shall be equal to the total compliance obligation for Compliance Year 2010, plus the total compliance obligation for Compliance Year 2010 multiplied by 1.3, minus the quantity of Solar Carve-Out Alternative Compliance Credits used for Compliance Year 2010, plus the number of Solar Carve-Out Renewable Generation Attributes from Compliance Year 2010 banked as provided under 225 CMR 14.08(2), plus the number of Solar Carve-Out Renewable Generation Attributes from Compliance Year 2010 deposited into the Solar Credit Clearinghouse Auction Account.

$$\text{Total Compliance Obligation}_{2011} = \text{Total Compliance Obligation}_{2010} + \text{Total Compliance Obligation}_{2010} \times 1.3 - \text{ACP Volume}_{2010} + \text{Banked Volume}_{2010} + \text{Auction Volume}_{2010}$$

(d) For each subsequent Compliance Year, the total compliance obligation shall be equal to the total compliance obligation from the previous Compliance Year, plus the difference between the total compliance obligation for previous Compliance Year and the total compliance obligation from the Compliance Year two years prior which is multiplied by 1.3, minus the quantity of Solar Carve-Out Alternative Compliance Credits used for the previous Compliance Year, plus the number of Solar Carve-Out Renewable Generation Attributes from the previous Compliance Year banked as provided under 225 CMR 14.08(2), plus the number of Solar Carve-Out Renewable Generation Attributes from the previous Compliance Year deposited into the Solar

Credit Clearinghouse Auction Account.

$$\frac{\text{Total Compliance Obligation}_{\text{CY}} = \text{Total Compliance Obligation}_{\text{CY-1}} + (\text{Total Compliance Obligation}_{\text{CY-1}} - \text{Total Compliance Obligation}_{\text{CY-2}}) \times 1.3 - \text{ACP Volume}_{\text{CY-1}} + \text{Banked Volume}_{\text{CY-1}} + \text{Auction Volume}_{\text{CY-1}}}{}$$

- (e) In the instance the Solar Credit Clearinghouse Auction under 225 CMR 14.05(4)(g) does not clear, prior to conducting an auction under 225 CMR 14.05(4)(h), the Department shall recalculate the Solar Carve-out Minimum Standard for the following Compliance Year by adding to the previously calculated total compliance obligation under 225 CMR 14.07(2)(c) or (d) the number of Solar Carve-Out Renewable Generation Attributes deposited into the Solar Credit Clearinghouse Auction Account such that the number of Attributes deposited has been counted twice.
- (f) In no instance shall the Solar Carve-Out Minimum Standard be a percentage less than that of the previous Compliance Year. If the calculations in 225 CMR 14.07(2)(c) or (d) were to result in such a situation, the Solar Carve-Out Minimum Standard shall be equal to the percentage from the previous Compliance Year.
- (g) Notwithstanding 225 CMR 14.07(2)(d), for the Compliance Year for which the total compliance obligation calculated in 225 CMR 14.07(2)(c) through (f) exceeds 455,520 MWh (calculated as the annual generation of 400 MW operating at a 13% capacity factor) then the total compliance obligation shall be set equal to 455,520 MWh for that Compliance Year for the purpose of calculating the Solar Carve-Out Minimum Standard.
- (h) Notwithstanding 225 CMR 14.07(2)(d), for all subsequent Compliance Years, the total compliance obligation shall be equal to the total compliance obligation from the previous Compliance Year minus the quantity of Solar Carve-Out Alternative Compliance Credits used for the previous Compliance Year, plus the number of Solar Carve-Out Renewable Generation Attributes from the previous Compliance Year banked as provided under 225 CMR 14.08(2), plus the number of Solar Carve-Out Renewable Generation Attributes from the previous Compliance Year deposited into the Solar Credit Clearinghouse Auction Account.
- (i) In the Compliance Year in which the Department stops qualifying Units for the Solar Carve-out Program under 225 CMR 14.05(4)(i), the Department shall announce the final Compliance Year of the Solar Carve-Out program. This final Compliance Year shall be calculated as the then current Compliance Year, plus the longest remaining Opt-In Term (in calendar quarters) for any qualified Solar Carve-Out Renewable Generation Unit divided by four. In the event that a Solar Credit Clearinghouse Auction is held and creates Re-minted Auction Account Attributes that can be used for Compliance Years after the calculated final Compliance Year, the Department shall extend the final Compliance Year by the number of years sufficient to accommodate the Compliance Years during which the Re-minted Auction Account Attributes can be used for Solar Carve-Out compliance.
- (j) For the year after the final Compliance Year, the Department shall set the Solar Carve-Out Minimum Standard to zero. From this time forward, Solar Carve-Out

Renewable Energy Generation Attributes shall cease to exist, and all generation from qualified Solar Carve-Out Renewable Generation Units shall produce RPS Class I Renewable Energy Attributes.

- (3) Post-2020 Standards. After 2020, the RPS Class I Minimum Standard shall increase by 1% per Compliance Year unless modified by law.

14.08: Compliance Procedures for Retail Electricity Suppliers

(1) Standard Compliance. Each Retail Electricity Supplier shall be deemed to be in compliance with 225 CMR 14.00 if the information provided in the Compliance Filing submitted pursuant to 225 CMR 14.09 is true and accurate and demonstrates compliance with 225 CMR 14.07. A Retail Electricity Supplier shall demonstrate to the satisfaction of the Department that RPS Class I Renewable Generation Attributes or Solar Carve-Out Renewable Generation Attributes used for compliance have not otherwise been, nor will be, sold, retired, claimed, used or represented as part of electrical energy output or sales, or used to satisfy obligations in jurisdictions other than Massachusetts.

(2) Banked Compliance. A Retail Electricity Supplier may use RPS Class I Renewable Generation Attributes or Solar Carve-Out Renewable Generation Attributes produced in one Compliance Year for compliance in either or both of the two subsequent Compliance Years, subject to the limitations in 225 CMR 14.08(2) and provided that the Retail Electricity Supplier is in compliance with 225 CMR 14.00 for all previous Compliance Years. In addition, the Retail Electricity Supplier shall demonstrate to the satisfaction of the Department that such Attributes:

- (a) were in excess of the RPS Class I Renewable Generation Attributes or Solar Carve-Out Renewable Generation Attributes needed for compliance in the Compliance Year in which they were generated, and that such excess Attributes have not previously been used for compliance with 225 CMR 14.00;
- (b) do not exceed 30% of the RPS Class I Renewable Generation Attributes or do not exceed 10% of the Solar Carve-Out Renewable Generation Attributes needed by the Retail Electricity Supplier for compliance with the RPS Class I Minimum Standard, in the year they were generated, subject to 225 CMR 14.09(2)(d);
- (c) were produced during the Compliance Year in which they are claimed as excess by the generation of electrical energy sold to End-use Customers in the ISO-NE Control Area, by the generation of electrical energy on End-use Customers' sides of retail meters in the ISO-NE Control Area, or by the generation of electrical energy from Off-grid Generation Units in Massachusetts; and
- (d) have not otherwise been, nor will be, sold, retired, claimed or represented as part of electrical energy output or sales, or used to satisfy obligations in jurisdictions other than Massachusetts.

(3) Alternative Compliance. A Retail Electricity Supplier may discharge its obligations under 225 CMR 14.07, in whole or in part, for any Compliance Year by making an Alternative Compliance Payment (ACP) to the Massachusetts Clean Energy Technology Center, established by M.G.L. ch. 23J. Such funds shall be held in an account separate from other accounts of the Center.

(a) RPS Class I Procedures. A Retail Electricity Supplier shall receive Alternative Compliance Credits from the Department, subject to the following:

1. The quantity of Credits, specified in MWhs, that can be applied to its obligations under 225 CMR 14.07(1) shall be determined by calculating the ratio of the total of ACPs paid for the Compliance Year to the ACP Rate for that Compliance Year.
2. The ACP Rate for the RPS Class I Minimum Standard shall be \$50 per MWh for Compliance Year 2003. For each subsequent Compliance Year, the Department shall publish the ACP Rate by January 31 of the Compliance Year. The ACP Rate shall be equal to the previous year's ACP Rate adjusted up or down according to the previous year's Consumer Price Index.
3. The Retail Electricity Supplier shall include with its Annual Compliance Filing copies of any ACP receipt(s) for ACPs made to the Massachusetts Clean Energy Technology Center during the Compliance Year.

(b) Solar Carve-Out Renewable Generation Procedures. A Retail Electricity Supplier shall receive Solar Carve-Out Alternative Compliance Credits from the Department, subject to the following:

1. The quantity of Credits, specified in MWhs, that can be applied to its obligations under 225 CMR 14.07(2) shall be determined by calculating the ratio of the total of Solar Carve-Out ACPs paid for the Compliance Year to the Solar Carve-Out ACP Rate for that Compliance Year.
2. The ACP Rate for the Solar Carve-Out Minimum Standard shall be \$600 per MWh. The Department may reduce the Rate, but not by more than 10% in a Compliance Year. The Department shall publish any new ACP Rate by January 31 of the Compliance Year with an explanation of the change.
3. The ACP Rate for that portion of a Retail Supplier's obligation under contracts entered into prior to January 1, 2010, shall be \$400 per MWh for Compliance Year 2010, \$450 per MWh for Compliance Year 2011, and \$500 per MWh for Compliance Year 2012.
4. The Retail Electricity Supplier shall include with its Annual Compliance Filing copies of any ACP receipt(s) for Solar Carve-Out ACPs made to the Massachusetts Clean Energy Technology Center during the Compliance Year.

(c) Use of Funds. The Department shall oversee the use of ACP funds by the Board of the Massachusetts Clean Energy Technology Center, as established in G.L. ch. 23J, § 2, so as to further the commercial development of RPS Class I Renewable Generation Units and Solar Carve-Out Renewable Generation Units.

#### 14.09: Annual Compliance Filings for Retail Electricity Suppliers

(1) Date of Annual Compliance Filing. For each Compliance Year, the Retail Electricity Supplier annually shall file an annual Compliance Filing with the Department no later than the first day of July, or the first Business Day thereafter, of the subsequent Compliance Year.

(2) Contents of Annual Compliance Filing. For each Retail Electricity Product, the Filing shall document compliance with the provisions of 225 CMR 14.07 and 14.08 to the satisfaction of the Department and shall include, but not be limited to, the following:

(a) Total Electrical Energy Sales to End-use Customers. Documentation of the total MWhs of electrical energy allocated by the Retail Electricity Supplier to End-use Customers in the Compliance Year. Such allocation is defined as the total quantity of the Supplier's Certificates Obligation that the Supplier correctly allocated or should have allocated to all of the Supplier's Massachusetts retail subaccounts in the NEPOOL GIS, in compliance with all relevant provisions of Part 4 of the NEPOOL GIS Operating Rules, or any successor rules.

(b) Electrical Energy Sales to End-use Customers by Product. Documentation of the total MWhs of each Retail Electricity Product allocated to End-use Customers in the Compliance Year, verified by an independent third party satisfactory to the Department, consistent with the Guidelines. Such allocation is defined as the quantity of the Supplier's Certificates Obligation that the Supplier correctly allocated or should have allocated to each of the Supplier's Massachusetts retail subaccounts at the NEPOOL GIS, in compliance with all relevant provisions of Part 4 of the NEPOOL GIS Operating Rules, or any successor rules. The Department shall keep product information confidential to the extent permitted by law.

(c) Attributes Allocated from the Compliance Year. Documentation of the total MWhs of each Retail Electricity Product allocated to End-use Customers that were derived from RPS Class I Renewable Generation and Solar Carve-Out Renewable Generation during the Compliance Year, and which may include electrical energy generated on End-use Customers' sides of retail meters in the ISO-NE Control Area or by Off-grid Generation Units in Massachusetts in the Compliance Year, as follows:

1. For electrical energy transactions included in the ISO-NE Settlement Market System, the Compliance Filings shall include documentation from the NEPOOL GIS administrator of the Retail Electricity Supplier's ownership of GIS Certificates representing RPS Class I Renewable Generation and Solar Carve-Out Renewable Generation during the Compliance Year.

2. For electrical energy transactions not included in the ISO-NE Settlement Market System, but for which the Retail Electricity Supplier has secured GIS Certificates from the NEPOOL GIS, the Compliance Filings shall include documentation from the NEPOOL GIS of the Retail Electricity Supplier's ownership of GIS Certificates representing RPS Class I Renewable Generation and Solar Carve-Out Renewable Generation during the Compliance Year.

(d) Attributes Allocated from Banked Compliance. Allocation by Retail Electricity Product of any quantity of RPS Class I Renewable Generation Attributes banked from one or both of the two previous years pursuant to 225 CMR 14.08(2) that are used to demonstrate compliance with the RPS Class I Minimum Standard in the current Compliance Year, and allocation by Retail Electricity Product of any quantity of Solar Carve-Out Renewable Generation Attributes banked from one or both of the two previous years pursuant to 225 CMR 14.08(2) that are used to demonstrate compliance with the Solar Carve-Out Minimum Standard or the RPS Class I Minimum Standard in the current Compliance Year;

(e) Alternative Compliance Credits. Allocation by Retail Electricity Product of any Alternative Compliance Credits or Solar Carve-Out Alternative Compliance Credits claimed pursuant to 225 CMR 14.08(3)(a), along with a copy of any Alternative Compliance Payment receipt(s), and allocation by Retail Electricity Product of any Alternative Compliance Credits or Solar Carve-Out Alternative Compliance Credits claimed pursuant to 225 CMR 14.08(3)(b), along with a copy of any Solar Carve-Out Alternative Compliance Payment receipt(s); and

(f) Attributes Banked for Future Compliance. Identification of any quantity of Attributes from RPS Class I Renewable Generation or Solar Carve-Out Renewable Generation, that the Retail Electricity Supplier anticipates claiming for purposes of Banked Compliance in subsequent years under the Banked Compliance provisions of 225 CMR 14.08(2).

(g) Contracts Subject to Lower ACP Rate under 225 CMR 14.08(3)(b)(3). Identification of any contract for a specific term of years that was executed before January 1, 2010, and its terms including but not limited to, the execution and expiration dates of the contract and the annual volume of electrical energy supplied.

#### 14.10: Reporting Requirements

(1) Certification. Any person required by 225 CMR 14.00 to submit documentation to the Department shall provide:

(a) the person's name, title and business address;

(b) the person's authority to certify and submit the documentation to the Department; and

(c) the following certification: "I hereby certify, under the pains and penalties of perjury, that I have personally examined and am familiar with the information submitted herein and based upon my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties, both civil and criminal, for submitting false information, including possible fines and imprisonment."

(2) Annual Renewable Energy Resource Report. The Department shall produce an annual report that summarizes information submitted to the Department by Retail Electric Suppliers in the Annual Compliance Filing submitted to the Department pursuant to 225 CMR 14.09(2).

(3) Identification of Renewable Generation Units.

The Department shall inform the NEPOOL GIS administrator which Generation Units should be designated as Renewable Generation Units pursuant to 225 CMR 14.00.

#### 14.11: Inspection

(1) Document Inspection. The Department may audit the accuracy of all information



submitted pursuant to 225 CMR 14.00. The Department may request and obtain from any Owner or Operator of an RPS Class I Renewable Generation Unit, a Solar Carve-Out Renewable Generation Unit, and any Retail Electricity Supplier information that the Department determines necessary to monitor compliance with and enforcement of 225 CMR 14.00.

(2) Audit and Site Inspection. Upon reasonable notice to a Retail Electricity Supplier or RPS Class I Renewable Generation Unit Owner or Operator, the Department may conduct audits, which may include inspection and copying of records and/or site visits to an RPS Class I Renewable Generation Unit, Solar Carve-Out Renewable Generation Unit, or a Retail Electricity Supplier's facilities, including, but not limited to, all files and documents that the Department determines are related to compliance with 225 CMR 14.00.

#### 14.12: Non-compliance

Any Retail Electricity Supplier or Owner or Operator of a RPS Class I Renewable Generation Unit or a Solar Renewable Generation Unit that fails to comply with the requirements of 225 CMR 14.00 shall be subject to the following provisions:

(1) Notice of Non-compliance. A failure to comply with the requirements of 225 CMR 14.00 shall be determined by the Department. A written Notice of Non-compliance shall be prepared and delivered by the Department to any Retail Electricity Supplier or Owner or Operator of a RPS Class I Renewable Generation Unit or Solar Renewable Generation Unit that fails to comply with the requirements of 225 CMR 14.00. The Notice of Non-compliance shall describe the Requirement(s) with which the Retail Electricity Supplier, Owner, or Operator failed to comply and the time period of such non-compliance.

(2) Publication of Notice of Non-compliance. A Notice of Non-compliance may be published on the Department's website and in any other media deemed appropriate by the Department. Such publication may remain posted until the Retail Electricity Supplier or Owner or Operator returns to compliance as determined by the Department.

(3) Planning Requirement. A Retail Electricity Supplier that fails to meet the requirements of 225 CMR 14.07 during a Compliance Year shall submit a plan for achieving compliance for the subsequent three years. The plan shall be filed with the Department no later than the first day of September of the Compliance Year subsequent to the Compliance Year for which the Retail Electricity Supplier was out of compliance or such date as the Department may specify.

(4) Suspension or Revocation of License. The Department shall refer its findings of non-compliance to the Massachusetts Department of Public Utilities. A Retail Electricity Supplier that fails to comply with 225 CMR 14.00 may be subject to the Massachusetts Department of Public Utilities Licensure Action under 220 CMR 11.07(4)(c)1.

#### 14.13: Severability

If any provision of 225 CMR 14.00 is declared invalid, such invalidity shall not affect other provisions or applications that can be given effect without the invalid provision or application.

REGULATORY AUTHORITY

225 CMR 14.00: M.G.L. c. 25A, § 11F.

## APPENDIX Q: MADEP Greenfield Landfill Approval



COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
WESTERN REGIONAL OFFICE

436 Dwight Street • Springfield, Massachusetts 01103 • (413) 784-1100

DEVAL L. PATRICK  
Governor

TIMOTHY P. MURRAY  
Lieutenant Governor

IAN A. BOWLES  
Secretary

LAURIE BURT  
Commissioner

Department of Public Works  
Town of Greenfield  
Town Hall, 14 Court Square  
Greenfield, MA 01301  
Attention: Sandra Shields, Director

SEP 01 2010

RE: Greenfield-DSWM-10-114-001  
Wisdom Way Landfill  
Post Closure Use – Solar Power  
**Permit Approval**  
BWPSW36  
Transmittal #X234090

Dear Ms. Shields:

The Massachusetts Department of Environmental Protection (the MassDEP) is issuing this permit approval to the Town of Greenfield (the Town) for the post closure use of the Town's capped landfill located off Wisdom Way (the landfill), as a solar power farm (solar farm). On July 12, 2010 the MassDEP received from the Town the BWPSW36 Major Post Closure Use permit application, under transmittal #X234090 (the application). The application was completed on behalf of the Town by TRC Corporation (TRC), and was signed and stamped by Robert E. Jackson, Massachusetts-registered Professional Engineer (P.E.) #48086; the application form was signed by Sandra Shields, Greenfield DPW Director. The application consists of the completed transmittal form, application form, text describing the proposed use, engineering calculations, and eight engineering drawings.

Summary of Proposal

The application proposes the construction and maintenance of a 2 megawatt (MW) photovoltaic solar farm on the 22.2 acres of the capped landfill, as follows:

- One permanent (paved) and two temporary access roads will be built on the landfill cap for vehicle access for construction and maintenance activities;
- A total of 1,226 concrete foundation footings will be poured in place within the vegetative support layer of the cap;
- 612 photovoltaic panel racks will be installed on the foundation footings;
- Two inverter/transformer enclosures will be installed on foundation footings;
- The photovoltaic panel racks will be connected to the inverters via above-ground and buried

Greenfield - Wisdom Way Landfill  
Post Closure Use - Solar Farm

- electrical cables; and
- The inverters will be connected to a transformer off the landfill via a buried electrical cable, for transmission of electricity to the WMECO utility grid at the adjacent WMECO electrical substation.

A permanent access road will be constructed within the northern perimeter of the Phase I/II cap, just south of the landfill gas extraction wells. The road will be constructed by stripping off the organics of the vegetative support layer, placement of a woven geotextile, addition of 18 inches of compacted gravel, with 3 inches of asphalt pavement over the gravel. Two temporary access roads will be constructed from the permanent access road, one each into Phase I/II and Phase III. The temporary access roads will be constructed by placement of a woven geotextile over the vegetative support layer, and addition of 18 inches of compacted gravel. The temporary access roads will be removed by the end of construction activities.

The concrete foundation (footings) for the photovoltaic racks will be constructed by excavating 6 inches into the vegetative support layer, and pouring concrete in place in forms 3 feet wide by 8 feet long by 1.5 feet thick. The photovoltaic racks will be bolted to the footings, and the electrical transmission wiring from the racks will be buried at the base of the vegetative support layer, in Schedule 80 PVC conduit, covered by either 12 inches of compacted soil or poured concrete. All photovoltaic rack assemblies and above-ground wiring will be kept at least 10 feet from any landfill gas vents.

Two concrete foundation (footings) for inverter/transformer enclosures will be constructed by excavating 6 inches into the vegetative support layer of the cap, and pouring concrete in place in forms approximately 10 feet wide by 30 feet long by 1.5 feet thick. Two pre-constructed inverter/transformer enclosure modules will be placed on the footings, and connected by buried electrical cable to a transformer located off the cap. The inverter enclosures will be kept at least 20 feet from any landfill gas vents.

TRC performed geotechnical analyses for the loading on the foundations, settling and stability of the foundations, and for loading on the access roads on the cap; TRC concluded that all analyses showed minimal loading and no stresses which would damage the impermeable layer of the landfill cap. TRC performed stormwater analyses for changes to stormwater runoff from the proposed work; TRC concluded that there will only be small changes in stormwater runoff, and the existing stormwater control system can handle the flows. TRC states that the proposed construction and operation of the solar farm will not alter the conclusions of the Qualitative Risk Assessment for the landfill (completed as part of the Comprehensive Site Assessment); i.e. that there are no significant risks to human health and the environment posed by the landfill, or by the presence of the solar farm on the landfill.

There are no proposed changes to the existing, long-term monitoring program for the landfill. The landfill will continue to be mowed annually, at a minimum. During the first year of operation, the grass cover of the landfill cap at the solar farm will be inspected monthly. If erosion is observed (especially along the drip-edges of the photovoltaic panels), the surface will be stabilized with wood chips, mulch, matting, or other erosion control materials. If issues are identified with problematic vegetation growth, a landscape consultant will be hired to investigate and address the issues.

The landfill will be surrounded by chain-link fence and the solar farm will be continually monitored by video cameras for security surveillance. The application states that Axio Power will contract with local firms for maintenance and security of the solar farm. Decommissioning of the solar farm if required in the future, would consist of removal of all structures, including foundations, and restoration of the landfill cap to its original condition.

TRC states that construction of the solar farm will begin in November of 2010, and will be completed by

Greenfield - Wisdom Way Landfill  
Post Closure Use - Solar Farm

February of 2011.

**MassDEP Determinations**

Personnel of MassDEP have reviewed the Post-Closure Use permit application for the Wisdom Way Landfill in accordance with MGL c. 111 s. 150A, MGL c. 30A, 310 CMR 19.000, and MassDEP's publication Landfill Technical Guidance Manual (the LAC), revised in May, 1997. MassDEP has determined that the application is approved in accordance with MGL c. 111, s. 150A and MGL c. 30A, subject to the conditions outlined below.

1. As proposed, a third-party, qualified engineering consultant (the on-site engineer) shall be present on-site at all times when any construction work is taking place on the cap. The on-site engineer shall have sufficient staff on-site to provide quality assurance/quality control (QA/QC) oversight for all construction work at the site, and shall submit monthly construction progress reports to the MassDEP and the Town, which shall summarize the work performed during the month. At the end of construction work, the third-party engineering consultant shall submit a completion report, signed and sealed by a Massachusetts-registered P.E., certifying that the work was completed in accordance with the application and the conditions of this permit.
2. The Town and their contractor(s) are responsible to ensure that all necessary precautions are taken to protect the health and safety of workers and the general public during both construction and maintenance of the solar farm. A copy of the site-specific Health & Safety Plan for the construction and maintenance of the solar farm shall be submitted to the MassDEP prior to the beginning of any construction work, which shall include protocols for monitoring of landfill gas as needed, protocols for modifying work practices if landfill gas is detected at levels deemed unsuitable, protocols for workers entering the inverter enclosures, and protocols for responding to any landfill gas alarm conditions within the inverter enclosures.
3. All disturbance of the landfill cap shall be limited to the proposed excavations and installations within and on top of the vegetative support layer of the cap, i.e. - no excavations or other penetrations shall be performed into the sand drainage layer of the cap without separate written approval from the MassDEP. All concrete footings on the cap shall extend only a maximum of 6 inches into the vegetative support layer of the cap, unless otherwise approved by the MassDEP. There shall be no penetrations (utility, conduit or other) at the base of any concrete footings or foundations. There shall be no penetrations of any kind of the impermeable layer of the cap.
4. The Town and their contractor(s) are responsible to ensure that the inverter and transformer enclosures on the landfill cap area will not accumulate landfill gas within the enclosures during the construction and operation of the solar farm. Any landfill gas levels exceeding 10% of the Lower Explosive Limit (% LEL) within an inverter/transformer enclosure shall trigger the requirements of 310 CMR 19.132(4)(g), for notification and action. The additional requirements for the enclosures include the following:
  - A. The maximum areal size of each of the two enclosures shall not exceed 30 feet long by 10 feet wide;
  - B. Each enclosure shall have a hard-wired, landfill gas monitor within the enclosure, fully operational at all times (with battery backup), which shall: (1) be calibrated to a methane standard; (2) shall have an audible alarm; (3) shall have a lighted, rotating beacon above the entrance door to the enclosure (for alarm mode); and (4) shall be tied into the SCADA web-based monitoring system for the solar farm;

Greenfield - Wisdom Way Landfill  
Post Closure Use - Solar Farm

- C. Each enclosure shall be ventilated as proposed, and the floor of each enclosure shall be solid, with no openings for landfill gas to enter at the floor level;
  - D. There shall be no utility, conduit or any other penetrations at the base of the enclosures or their foundations; i.e. - all utility penetrations shall enter only through the side of the enclosure, not the bottom, and these penetrations shall be fully sealed (both outside and within each conduit);
  - E. The enclosures shall not include a heater; and
  - F. As part of the site-specific H&S Plan, a written protocol shall be prepared and submitted for all entrance by workers into the enclosures, and for regular calibration and maintenance of the landfill gas monitors.
5. Prior to the start of construction, an addendum shall be submitted to the MassDEP which shall contain:
- A. The information required at Conditions 2 and 4 of this permit; and
  - B. Cold- weather protocols for construction work, specifically for the installation of concrete footings and foundations.
6. All necessary precautions shall be taken to ensure that the proposed construction and maintenance work associated with the solar farm shall not in any way damage the impermeable layer of the landfill cap, the Phase III landfill liner, leachate collection/conveyance pipes, landfill stormwater control structures, landfill monitoring wells, or the landfill gas collection system. If any damage occurs to any of the above-listed landfill components, the Town shall notify MassDEP immediately (within 24 hours maximum), a written plan for repair of the components shall be submitted to MassDEP within 48 hours, and any repair work shall be completed on the schedule determined by MassDEP.
7. Prior to the commencement of construction activities, all landfill gas vents, landfill gas extraction wells, monitoring wells and other existing, above-ground structures of the landfill cap and appurtenances shall be flagged for visibility, and protective barriers shall be placed around such structures as needed to prevent damage by vehicles accessing the cap area.
8. Vehicles operating on the landfill cap shall only operate on the designated access roads, except for low-pressure construction equipment (with ground pressures of 7 PSI or less) which may operate off the access roads, in accordance with the remaining conditions of this permit. All operators of vehicles entering the cap area shall be clearly instructed by the on-site engineer and/or the contractor of the requirements of this permit prior to arrival, to avoid damage to the landfill cap components. Excavations into the vegetative support layer of the cap shall not be performed using a toothed excavation bucket, and the on-site engineer shall observe the full extent of each such excavation. If MassDEP determines that the use of excavation equipment is creating the potential for damage to the impermeable cap layer, the usage of such equipment shall cease immediately upon notification by MassDEP, and all remaining excavation work on the cap shall be performed by hand digging.
9. During the first year of operation of the solar farm, inspections of the landfill cap shall be performed on a monthly basis, and monthly inspection reports shall be submitted to MassDEP. Following the first year of operation of the solar farm, inspections of the landfill cap shall be performed on a quarterly basis, and quarterly inspection reports shall be submitted to MassDEP. Environmental monitoring shall continue to be performed at the landfill on an annual basis, and mowing of the landfill shall continue on a minimum of an annual basis. Any erosion problems,



Greenfield - Wisdom Way Landfill  
Post Closure Use - Solar Farm

settlement problems, or other issues observed on the landfill cap shall be reported to MassDEP and repaired immediately.

10. This post-closure use permit shall be valid for a period of 30 years from the date of this permit, provided that MassDEP may amend the term of the permit in accordance with an approved modification pursuant to either 310 CMR 19.039 or 19.040. If the Town intends to operate the Solar Farm after the expiration of this permit, the Town is required to submit a request for a renewal of the permit at least 90 days prior to the expiration of the permit.
11. MassDEP and its agents and employees shall have the right to enter upon the landfill at all reasonable times, to inspect the landfill and any equipment, structure or land located thereon, take samples, recover materials or discharges, have access to and photocopy records, to perform tests and to otherwise monitor compliance with this Permit and all environmental laws and regulations. This right of entry and inspection shall be in addition to MassDEP's access authorities and rights under applicable federal and states laws and regulations, as well as any permits or other agreements between the Permittee and MassDEP.
12. MasDEP reserves the right to require additional or increased monitoring or maintenance activities in the event that the post-closure use is or may be having a detrimental effect on the landfill cap or appurtenances. MassDEP reserves all rights to suspend, modify or rescind this permit, should the conditions of this permit not be met, should the Solar Farm create nuisance conditions or threats to public health, safety or the environment, or should MassDEP otherwise determine that continued post-closure use is negatively impacting the landfill cap or appurtenances.

Pursuant to 310 CMR 19.037(5), any person aggrieved by the issuance or denial of this permit decision, except as provided for under 310 CMR 19.037(4)(b), may file an appeal for judicial review of said decision in accordance with the provisions of M.G.L. c. 111, s. 150A and c. 30A not later than thirty [30] days following the receipt of the final permit. The standing of a person to file an appeal and the procedures for filing such appeal shall be governed by the provisions of M.G.L. c. 30 A. Unless the person requesting an appeal requests and is granted a stay of the terms and conditions of the permit by a court of competent jurisdiction, the permit decision shall remain effective or become effective at the conclusion of the 30 day period.

Any aggrieved person intending to appeal the decision to the superior court shall provide notice to MassDEP of said intention to commence such action. Said Notice of Intention shall include the MassDEP File Number (10-114-001) and shall identify with particularity the issues and reason(s) why it is believed the approval decision was not proper. Such notice shall be provided to the Office of General Counsel of MassDEP and the Regional Director for the regional office which made the decision. The appropriate addresses to which to send such notices are:

General Counsel  
Department of Environmental Protection  
One Winter Street-Third floor  
Boston, 02108

Regional Director  
Department of Environmental Protection  
436 Dwight Street - Fifth Floor  
Springfield, MA 01103

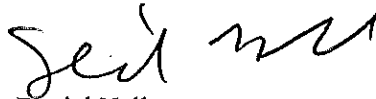
Greenfield - Wisdom Way Landfill  
Post Closure Use - Solar Farm

No allegation shall be made in any judicial appeal of this decision unless the matter complained of was raised at the appropriate point in the administrative review procedures established in those regulations, provided that matter may be raised upon a showing that it is material and that it was not reasonably possible with due diligence to have been raised during such procedures or that matter sought to be raised is of critical importance to the public health or environmental impact of the permitted activity.

This approval pertains only to the Solid Waste Management aspects of the proposal and does not negate the responsibilities of the owners or operators to comply with any other local, state or federal laws and regulations now or in the future.

If you have any questions about this matter, please contact Larry Hanson of this office at 413-755-2287.

Sincerely,

A handwritten signature in black ink, appearing to read 'Daniel Hall', with a stylized flourish extending to the right.

Daniel Hall  
Section Chief, Solid Waste Management

cc: Greenfield Board of Health  
Greenfield Planning Board  
Mayor William Martin  
Axio Power - Bill Jordan  
TRC - David Andrews, P.E.

## **APPENDIX R: Signed Disclosure of Beneficial Interests, Non-Collusion, and Tax Compliance Certificate**

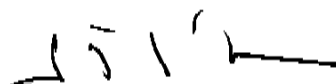
Attachment 2

**CERTIFICATE OF TAX COMPLIANCE**

Pursuant to Massachusetts General Law chapter 62C, sec 49A, I hereby certify under penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

02-0636068

Social Security or Federal I.D. number



Signature: Individual or Corporate Officer

12.18.10

Date

**PLEASE PRINT**

Corporate Name:

Blue Wave Capital LLC

Address:

31 North Street

City, State, Zip Code:

Boston MA 02109

## Attachment 3

**CERTIFICATE OF NON-COLLUSION**

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person, business, partnership, corporation, union committee, club or other organization, entity or group of individuals.



---

Signature of individual submitting bid or proposal

---

Name of Business

## Attachment 4

## CERTIFICATE OF AUTHORITY

At a duly authorized meeting of the Board of Directors of the

Blue Wave Capital, LLC held on 12.18.10  
(Name of Corporation)

(Date)

At which all the Directors were present or waived notice, it was voted that,

John P. DeVries Managing Partner  
(Name) (Officer)

of this company, be appointed and is hereby authorized to execute contracts and bonds in the name and behalf of said company, and affix its Corporate Seal thereto, and such execution of any contract or obligation in this company's name on its behalf by said officer, under seal of the company, shall be valid and binding upon this company.

A TRUE COPY,

ATTEST: [Signature]  
(Clerk)

Place of Business: 31 Middle St Boston, MA 02109

DATE OF THIS CONTRACT: \_\_\_\_\_

I hereby certify that I am the Clerk of the Blue Wave Capital  
that John P. DeVries is the duly elected Managing Partner

of said company, and the above vote has not been amended or rescinded and remains in full force and effect as of the date of this contract.

[Signature]  
(Clerk) (Corporate Seal)

Attachment 5

**FOREIGN CORPORATION CERTIFICATION**AFFIDAVIT OF COMPLIANCE  
Form AF-4A 1/78EXECUTIVE OFFICE FOR  
ADMINISTRATION AND FINANCE

The Commonwealth of Massachusetts

- ☒ MASSACHUSETTS BUSINESS CORPORATION  
☐ NON-PROFIT CORPORATION  
☐ FOREIGN (non-Massachusetts) Corporation

I, John P. McV. Warrs, ☒ President ☐ Clerk of  
Blue Wave Capital, LLC whose principal office is  
(Name of Corporation)

located at 31 Maple St Boston, MA 02109  
(Address)

do hereby certify that the above named Corporation has filed with the State Secretary all certificates and annual reports required by Chapter 156B, Section 109 (Business Corporation), by Chapter 181, Section 4 (Foreign Corporation), or by Chapter 180, Section 26A (non-profit Corporation) of the Massachusetts General Laws.

SIGNED UNDER THE PENALTIES OF PERJURY THIS 18<sup>th</sup> day of  
December, 2010.

[Signature]  
(Signature of responsible Corporate Officer)



## Attachment 6

## Disclosure of Beneficial Interests in Real Property Transaction

This form contains a disclosure of the names and addresses of all persons with a direct or indirect beneficial interest in the real estate transaction described below. This form must be filed with the Massachusetts Division of Capital Planning and Operations, as required by M.G.L. c7, § 40J, prior to the conveyance of or execution of a lease for the real property described below. Attach additional sheets if necessary.

1. Public agency involved in this transaction: Town of Amherst, MA  
(Name of jurisdiction)
2. Complete legal description of the property:  
Property is as described in Addendum # 4 to RFP # 11-101
3. Type of transaction: ☐ Sale ☒ Lease or rental for 30yr. (term):
4. Seller(s) or Lessor(s): Town of Amherst, MA  
Purchaser(s) or Lessee(s): BlueWave Capital, LLC
5. Names and addresses of all persons who have or will have a direct or indirect beneficial interest in the real property described above. Not: If a corporation has, or will have a direct or indirect beneficial interest in the real property, the names of all stockholders must also be listed except that, if the stock of the corporation is listed for sale to the general public, the name of any person holding less than ten percent of the outstanding voting shares need not be disclosed.

Name

Address

BlueWave Capital, LLC31 North St. Boston, MA 02109

Corporate members:

J. P. DeVriesElizabeth B. Carroll

(Continued on next page)

## 5. Continued

None of the persons listed in this section is an official elected to public office in the Commonwealth of Massachusetts except as noted below:

Name

Title or position

n/a

6. This section must be signed by the individual(s) or organization(s) entering into this real property transaction with the public agency named in item 1. If this form is signed on behalf of a corporation, it must be signed by a duly authorized officer of that corporation.

The undersigned acknowledges that any changes or additions to item 4 of this form during the term of any lease or rental will require filing a new disclosure with the Division of Capital Planning and Operations within 30 days following the change or addition.

The undersigned swears under the pains and penalties of perjury that this form is completed and accurate in all respects.

Signature:

[Signature]

Printed name:

John P. DeVillars

Title:

Municipal Partner

Date:

12/18/10

## APPENDIX S: Signed Addendum Acknowledgements

Town Of

AMHERST *Massachusetts*

OFFICE OF THE SUPERINTENDENT OF PUBLIC WORKS  
586 SOUTH PLEASANT STREET  
AMHERST, MA 01002  
TEL. 413-259-3050 FAX 413-259-2414

*Gray*  
*Capacity of response*  
*proposed*

## Addendum No. 1

*7's*  
*site plan*  
*minor modifications*  
*put to DEP*  
*who*

BID DOCUMENTS: RFP # DPW11-101

CONTRACT FOR:

*Old Landfill Reuse Proposal*

Nov 8, 2010

The bid specifications as stated in the Instructions to Bidders for the above referenced bid are changed as follows:

1. The response date of this RFP is changed to December 16, 2010.

Several Questions have been raised and we are discussing the issuance of several changes to the RFP. It is expected that the changes will be released by November 12, 2010.

All other terms and conditions remain unchanged. There is 1 page to this Addendum.

11/8/2010

Issued date

*Guilford Mooring*  
Guilford Mooring, P.E.  
Superintendent of Public Works

11/10/10

Acknowledged date

*2712*  
Contractor

Town Of

**AMHERST** *Massachusetts*

OFFICE OF THE SUPERINTENDENT OF PUBLIC WORKS  
586 SOUTH PLEASANT STREET  
AMHERST, MA 01002  
TEL. 413-259-3050 FAX 413-259-2414

**Addendum No. 2****BID DOCUMENTS: IFB # DPW11-101**

CONTRACT FOR:

***Old Landfill Reuse Proposal***

Nov 30, 2010

The bid specifications as stated in the Instructions to Bidders for the above referenced bid are changed as follows:

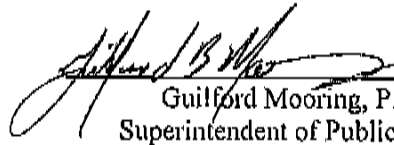
1. The response date of this RFP is changed to December 23, 2010.
2. The original RFP is superseded by the attached RFP with "addendum 2" in the footer. All changes are highlighted in yellow.

Questions will be taken until December 16, 2010.

All other terms and conditions remain unchanged. There are 25 pages to this Addendum including this cover letter.

11/30/2010

Issued date

  
Guilford Mooring, P.E.  
Superintendent of Public Works

12 / 2 / 10

Acknowledged date

2511  
Proposer

*Blue Wave Corp 21 h2c*

Town Of

**AMHERST** *Massachusetts*

OFFICE OF THE SUPERINTENDENT OF PUBLIC WORKS  
586 SOUTH PLEASANT STREET  
AMHERST, MA 01002  
TEL 413-259-3050 FAX 413-259-2414

**Addendum No. 3****BID DOCUMENTS; RFP # DPW11-101**

CONTRACT FOR:

***Old Landfill Reuse Proposal***

Dec 13, 2010

The bid specifications as stated in the Instructions to Bidders for the above referenced bid are changed as follows:

1. The response time of this RFP is changed to 11:00 am. So the current due date is Thursday at 11:00 am on December 23, 2010.
2. Responses to a few questions;
  - a. Submittal clarification: The Town is requesting one paper copy of each proposal and one digital copy on a CD that is in a format that can be emailed to the members of the review committee.
  - b. Site visits: The site of the project is accessible off of Old Belchertown Rd. An official site visit will not be scheduled but the town will be happy to accommodate anyone wanting a guided visit.
  - c. Drawings for the Major Modification Permit: All five drawings for this permit are now on the Town web page at,  
  
<http://www.amherstma.gov/index.aspx?NID=1394>
  - d. "New" Landfill site: This current proposal does not include the new landfill site at 740 Belchertown Road.
  - e. Areas 5 and 6: These areas have been used in the past as snow dumps. This information was provided for your information only. If a proposal wishes to use this area for their proposal that is fine. The town is currently looking at other

Addendum #3  
RFP # DPW11-101  
Page 2 of 2

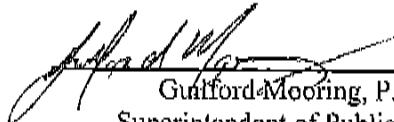
areas in Town to use as snow dumps this year and into the future.

Just a reminder that questions will be taken until December 16, 2010. Questions may be emailed to [mooringg@amherstma.gov](mailto:mooringg@amherstma.gov). It is anticipated that the final addendum will be sent out December 17, 2010. This addendum can be emailed if you provide your email address and company name to the email address above.

All other terms and conditions remain unchanged. There are 2 pages to this Addendum including this cover letter.

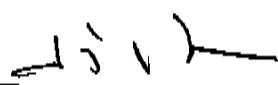
12/13/2010

Issued date

  
Guilford Mooring, P.E.  
Superintendent of Public Works

12-14-10

Acknowledged date

  
Proposer



*Town Of***AMHERST** *Massachusetts*

OFFICE OF THE SUPERINTENDENT OF PUBLIC WORKS  
586 SOUTH PLEASANT STREET  
AMHERST, MA 01002  
TEL. 413-259-3050 FAX 413-259-2414

**Addendum No. 4 & final****BID DOCUMENTS: RFP # DPW11-101**

CONTRACT FOR:

***Old Landfill Reuse Proposal***

Dec 17, 2010

The following are responses to questions submitted over the last few days. There are no changes to the RFP enclosed.

1. Question: "Could you inform me about the 6 electrical poles that are mounted into the landfill? Can we replace the cut ones with new? We would like to run the 3 phase voltage power over those poles to the street."

Answer: These Poles penetrate the cap of the landfill. They may be replaced if approved by DEP in the reuse plan. Based on my experience DEP will probable allow the replacement as long as the new poles include a method to seal the cap penetration.

2. Question: "Is the Town of Amherst interested in purchasing the electric output of the proposed solar array through a net metering arrangement?"

Answer: We have not ruled out this possibility.

3. Question: "What is the approximate annual electric consumption of the Town of Amherst?"

Answer: The FY 2010 Electric consumption spread sheet for the Town has been added to the following website. <http://www.amherstma.gov/index.aspx?NID=1394> There is also a copy of the electric bill for the main barn and WWTP.

4. Question: "What is the transmission voltage of the local distribution grid?"

Answer: We do not have this information.

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5. Question: "Has WMECO been notified of a potential solar project?"

Answer: Yes. They were also looking at this site

6. Question: "Has there been any discussion with WMECO about the interconnection of a solar facility on the landfill? What issues, concerns etc., does WMECO have, if any?"

Answer: No.

7. Question: "What is the current zoning for the landfill? Is a solar facility a permitted use? What permits or zoning changes are needed, if any, and will the Town or the developer be required to secure the proper zoning to permit the project?"

Answer: The property is included in the Professional Research Park zone. We do not have a use for Solar facilities, so this would require a special permit. It would be up to the proposer how they wish to proceed with getting the special permit in their proposal.

8. Question: "Can the Town complete phase 3 filling of localized depressions before phase 1 and phase 2 work begins?"

Answer: Yes this can be done.

9. Question: "Does the "sequential 1.75-acre re-grading limitation" apply to phase 3 work?"

Answer: Yes

10. Question: "Can the phase 1 and phase 2 topographic re-grading plan be changed to a more southern orientation?"

Answer: The orientation could possibly be rotated a little more to the south, but probably not by much.

11. Question: "What engineering firm or organization was responsible for developing and executing the landfill closure plan? Please provide contact information."

Answer: Huntley Associates P.C did the design in the 1980s. Their phone number is 1-800-227-7723.

12. Question: "Is the landfill cap a soil cap, flexible membrane line, or other?"

Answer: The cap is in clay cap with 12 inches of cover. The cover number will change once the regrading is complete.

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13. Question: "As opposed to a ballasted mounting system for the solar racks, can the project install posts that penetrate the cap?"
- Answer: Any penetration to the cap must be approved by DEP. From the Town's perspective hundreds of penetrations in the cap would not be the ideal situation.
14. Question: "At what intervals are the following landfill monitoring operations performed?"
- a.) Soil Testing
  - b.) Groundwater Testing
  - c.) Surface Water Testing
  - d.) Gas Sampling
- Answer: They all vary. Gas sampling is twice a year and is the only activity that is done on the capped area for sampling.
15. Question: "Does the Town monitor settlement? If so, are there reports available for review?"
- Answer: No
16. Question: "Does the Town monitor erosion? If so, are there reports available for review?"
- Answer: No. Erosion has been minor over the life of the landfill and there has been no requirement for monitoring.
17. Question: "Does the Town irrigate the landfill?"
- Answer: No
18. Question: "What is the existing vegetation maintenance plan?"
- Answer: The capped area is mowed once a year.
19. Question: "Will the Town retain liability for arsenic contaminated soil?"
- Answer: The Town will retain liability of the arsenic soil and anything else that has been deposited in the landfill over its life. The Town may not wish to be responsible for any additional waste created from this proposal.
20. Question: "What are the existing landfill security features?"
- Answer: There is a gate at the entrance to the facility. There is no fence around the site.
21. Question: "Besides visual, noise and security issues, are there any other specific compatibility issues with neighboring properties that we should address?"

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Answer: Those are the primary concerns we could think of.

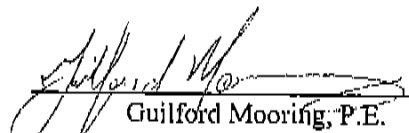
22. Questions: "It has come to our attention that the landfill site is located within Priority Habitat for the Grasshopper Sparrow and that the Town is currently consulting with NHESP regarding the proposed re-grading work. Has the Town consulted with NHESP about the proposed solar PV project, and if so, has NHESP provided any feedback with regard to MESA review and/or permitting?"

Answer: NHESP knows about the possibility of the solar project but we have not directly asked for a comment. It does raise an interesting concept since all closed landfills in Mass. would be priority habitat for this animal.

All other terms and conditions remain unchanged. There are 4 pages to this Addendum including this cover letter.

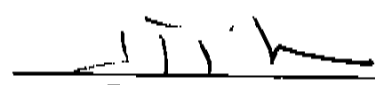
12/17/2010

Issued date

  
Guilford Mooring, P.E.  
Superintendent of Public Works

12/18/10

Acknowledged date

  
Proposer

Blue Wave Capital LLC

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